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ON AND COAL TRADES IN SCOTLAND.

of coal and iron from Scotland during the first of the present year, as compared with those of the corresponding of the previous year, could be accepted as an exact indication of mining matters in the country, the conclusion must be that the prosperity of these important branches has sustained a decided and disastrous check. Without doubt, the coal trade for the whole country, but merely taking those figures (which is by far the most important mining branch) that whereas during the month of January, 1872, the exports amounted to 10,927 tons, in January last they fell to 10,000 tons; and if we take the month of March a still more marked fall is observable. In March, 1872, the exports of coal amounted to 11,623 tons, whilst in March of the present year they have only reached 4914 tons. The iron shipments, also, have also greatly diminished in the same month. The iron masters having evidently been induced to practice retrenchment by the extremely high prices. But it might be suggested that a large proportion indeed of the mining products are usually absorbed by the home trade, the demands for which, in any particular period, be so large and so constant, that direct attention from the foreign markets, and in consequence a falling off in the exports, at the same time that there is a decrease in the production. The possibility of this is at once admitted, but in the present instance it is hardly accurate anything of the kind having taken place. The disputes that occurred in the coal trade towards the end of the year sent the prices up beyond what had hitherto been the case; fuel was rendered scarce as well as dear, and a large quantity of coal is required. The prices of iron consequently increased to an enormous extent; so that the malleable and cast-iron trades became unprofitable, and manufacturers could not purchase the raw material at a price that would enable them to carry on their works to any extent. The prices of coal and iron rose no extra impetus was given to the general trade of the country, such as would have been expected supplies of these minerals, and legitimately due. The rise in prices was, therefore, in a great measure, and attributable to causes that were abnormal in the iron and coal trade. Among these causes the iron and coal "rigs" undoubtedly, but these "rigs" could not have existed or been so long of any length of time had there been good iron and coal turn-over of material.

reason of the augmented prices was, without a doubt, by the miners to shorten their hours of labour, and increase their wages. There had been strikes in its of trade, now for shorter hours, and again for its it was left for the miners alone to accomplish time, and by the same means. Mr. McDONALD, who president of the National Association, and has taken an connection with recent mining legislation, had been with miners for many years before they were sufficed to perform the feat alluded to. What particular McDONALD had for such a course are not open to question regarded as wrong to impugn the motives of a man be a disinterested labourer for the elevation of a women. But it remains a somewhat curious fact McDONALD (himself a coalmaster) should have worked so hard, and so determinedly for the employed as against the employer, in a circumstance by, however, what is to be said is that in the autumn of last year Mr. McDONALD was convincing the miners of Scotland, and especially of Scotland, that the ball of ease and prosperity lay at their feet, and had only to touch it to set it agoing. At that time the demand and the supply of coals were about on a par, and nothing, showing signs of taking the upper hand. He warned the miners that now was their time for action, they continued to work ten and twelve hours a day, and would speedily get glutted with coals, and their wages would be down; but if they at once shortened their hours of labour, they would be curtailed, the price of coals would increase, and they were bound to get their share of the increase of wages. The logic of all this was irresistible. The question was clearly placed before them, whether they would work long hours and have their wages diminished, or if they had them increased, the miners did not hesitate to choose. Where Unions existed they were rapidly formed, and where they did not exist they were formed. Strikes were organised and carried to a successful conclusion in every district, and again in that, the remaining districts were taken by Union contributions, until the hours were raised in a great number of localities; and it would, doubtless, have gone on until something like uniformity had been obtained, had it not been for a series of strikes, which led to strikes that were not authorised by the executive, some of which ended in defeat. In many pits for a time while the strikes continued, the loss of hours of work and consequent lessening of the output, if they succeeded, led to a very great decrease in the necessity of a correspondingly large increase in the price of coals, which is a plain and uncoloured account of the causes of the strikes in Scotland, and it was very curious to observe that a few weeks ago the miners were declaring that they were to blame for the high prices, and that if they had not struck (the miners) would be content with their wages. The curious were the views which some of the miners had evidently not studied the question, expressed by the conduct of the coalmasters. They were represented more than extortioners, making huge fortunes by the sale of coals, and all the time it was entirely forgotten that the price of coals had increased, many of the coalmasters, to dispose of where formerly they had a hundred per cent. profit, doubt that where coalmasters were fortunate in their sales, disputes with their men they must have made

great deal of money during the famine, but cases like these were few compared with others where there were little or no coals to sell, and heavy establishment and "on-cost" expenses, not to speak of long standing and unexpired contracts, which had to be implemented at a very heavy loss.

It is quite unnecessary to go on to explain the way in which the coal famine affected the iron trades and those dependent upon them. This will be readily understood by every reader conversant with such matters. In the course of a few months the prices of pig-iron were forced up fully 50 per cent., blast-furnaces were put out for want of fuel, and rolling-mills brought to a stand; so that, if the prices of iron rose as rapidly and as much as those of coal, the rise was to the advantage neither of the ironmasters nor the community.

Previous to the disorganisation in the coal and iron trades, speculation in mining matters was, it must be admitted, rather too rife—a result, no doubt, of the plentiful supply of money; but by that disorganisation speculation was checked, capitalists preferring to leave their money in the banks, or invest in safe securities, at a low rate of interest, rather than risk it in the extension of public works. There could be no better proof than this of what we have endeavoured to show—namely, that the high prices of coal and iron were the result of the concerted action of the miners, and not of any natural increase in the prosperity of trade generally. Among the companies that found it expedient to delay the extension of their works was the Omoa and Clelland Iron Company (Limited), who were erecting a large establishment in the neighbourhood of Glasgow, where all the newest improvements in iron manufacture were to be introduced, including DANKS'S patent puddling-furnace. It is understood, however, that these works will now be gradually proceeded with, and we may have an opportunity of referring to them at a future time.

As regards the present state of the coal and iron trades it may be stated that the best household coals are now delivered at 24s. per ton, while very good qualities can be had from 3s. to 4s. cheaper. It is believed that a further reduction in price will soon have to be made, as the miners are now in most places working steadily, and stocks are reported to be accumulating at the pit-heads. There are great complaints against the railway companies for failing to supply a sufficient number of wagons to carry the coals from the pits to market. The prices of iron warrants have not changed much for a couple of weeks, and at the date of writing business is being done at from 120s. to 120s. 6d. Little more than a month ago the best makers' brands were selling at 165s., but they can now be had at 142s., and it is believed that they will soon recede to a lower figure.

THE EXTENSION OF OUR COAL FIELDS.

SIR,—Among the topics and discussions which it is usual to sensationalise or dignify as great questions of the day not one has been of late, is now, and probably long will be, more familiar and more salient than that which we heed with the monosyllable—Coal. Never since the black mineral had its glorious light and heat first brought out of the dark carboniferous region where for countless ages it had treasured its precious subearths for winter, which it had imbibed when flourishing in its stately forms of *Sigillaria*, *Lepidodendron*, &c., that lifted up their lofty heads above cypress swamps, jungles, and forest growths, until there should come upon the earth the thin-skinned race that would need it, and that would draw it forth from its stoney safe with the wimble, or still better with the diamond drill. Never, perhaps, since then has coal more busied itself with our tongues, and thoughts, and purses than at present. The great consumption, the enormously and rapidly increased cost, and the apparently diminished supply of coal have occasioned keen anxiety and enquiry about its exhaustibility, or its sufficiency to meet the requirements of generations to come, an anxiety that has permeated through the length and breadth of the land, and through all classes of Her Majesty's subjects; hence the search for this now more than ever valuable mineral is being eagerly prosecuted, and landed proprietors, who were alarmed a few years ago at the idea of coal works being established near their domains, are now enquiring whether there is a probability that this treasure may be found upon their estates. I have a case in point, and one calculated in a certain degree to relieve national misgivings.

In the autumn of last year I was called to examine geologically and report upon the possibility of finding coal on an estate in the Isle of Axholme, the extreme north-west corner of Lincolnshire, the property of Mrs. Lee, of Epworth. Warped deposit formed by the Rivers Ouse and the Trent covers a great area of alluvium of the island—a shingle beach at Wroot, gypseous marls, trias clay, and New Red Sandstone at Epworth.

This being the geological character of the island, compelled me to extend my investigations into the palaeozoic rocks of parts of the adjacent counties of Yorkshire and Nottingham. At the Shireoaks Colliery I was kindly permitted by Mr. Wright to consult the elaborately-constructed section of the sinking to the top hard coal, depth 509 yards, and beneath which should be found at 200 yards the Siltstone coal. This section afforded me much valuable information. The section in the railway cutting shows the junction of the Permian and Trias. Near Rotherham, at Parkgate Station, the Barnsley Thick coal is exposed; at Denaby Colliery this coal is worked at the depth of 500 yards. The Siltstone coal is here expected to be found at the depth of 200 yards below it.

The Rothemard red rock (the Roth liegendes of Thuringia) is here well developed—some 60 yards thick. This is again covered with some 33 yards of magnesian limestone, which is again succeeded before Doncaster is reached by New Red Sandstone. To the east of Doncaster alluvium only is seen until Epworth is reached, but at Wroth, five miles west of Epworth, the New Red Sandstone is found at 10 ft. from the surface. These facts, with a careful observation of the strike and almost uniform dip of the strata, led me to infer that, in the absence of faults, before the eastern edge of the Yorkshire and Nottingham coal field was reached some valuable seams could be won, and at a reasonable and accessible depth. It affords me much pleasure to communicate to you that Mrs. Lee, having confidence in my report, section, and explanation, at once determined to commence boring, but, I am sorry to add, not with the invaluable diamond drill. The result, however, even with the common wimble, is exceedingly satisfactory; coal is found, and of good quality. A telegram conveying information of this important discovery from a gentleman holding an official position in the district, was for-

warded to the Carlisle *Patriot* office in these few words—"Coal was found here yesterday, and all Mr. Knipe's speculations respecting a large coal field are realised."
J. A. KNIPE.
Botcherby, Carlisle.

OUR IRONSTONE FIELDS—PAST AND PRESENT.

SIR,—In an article on our Ironstone Mines in the Supplement to last week's Journal the writer says—"Seeing that coal is being bored for at a point at no great distance from where iron was formerly made, and in the opinion of Mr. Godwin-Austen and Mr. Prestwich is likely to be found."

Now, I have an impression that this writer mistakes the opinion of these two eminent geologists. The object of the boring at Battle, as recommended by Mr. Godwin-Austen, is not with the expectation of finding coal there, but to ascertain what precise geological beds are to be found there below the thinnest part of the Wealdon formation. If I recollect rightly, the substance of the article by Mr. Prestwich in the number of the "Popular Science Review" for July Mr. Godwin-Austen's opinion is that coal is likely to be found in the valley of the Thames, to the north of the North Downs, whilst Mr. Prestwich thinks it is more likely to be a little further north, near Ware, in Hertfordshire, and in small patches at intervals, until the Somersetshire coal field is reached.

I have not the number of the "Popular Science Review" at hand from which to quote, but I think I am right in my present statement; and as it is a very interesting article it is well worth the perusal of any of your readers who take an interest in the subject. Both geologists think the North of France coal field formed the extension of what will be found in Kent or Middlesex from Bath, &c.

CAPT. THOMAS PARKYN ON TIN DRESSING, &c.

Str.—One feature presented in the columns of your valuable Journal has of late pleasingly and profitably engaged my attention. I refer to the contributions of practical miners on vital mining questions. The heading of this letter, however, intimates the lines of demarcation within which the following remarks are intended to be confined. Happily it is unnecessary to employ many sentences in showing that this subject is of vast importance. By anyone who has only the slightest acquaintance with tin mining, as well as by those who spend their lives in this particular field, it will be regarded as an axiom, neither requiring formal demonstration nor admitting of contradiction. Everyone will admit that it is one thing even to have rich lodes, but quite a different matter to get their full practical produce into the market. I am persuaded that nearly the whole of successful mining is contained in the link which unites these two points. There are many mines which may be described as paradoxical, being rich intrinsically, as is shown by their returns of ore, and yet poor commercially, as is proved by their balance-sheets. How to deal with this *pons asinorum* seems to be the great mining problem of the day, which only men of extensive practical experience, general intelligence, and industry can solve. Anything, therefore, helping to attain to this desirable goal is of great value, and ought to receive more than passing attention. Hence, also, my reason for thus troubling you.

case for this plan of his "Save-all" dressing-floors has several characteristics worthy of special attention. I will, by your permission, point out just one or two of these, which, I apprehend, will commend themselves to every miner and, perhaps, to your readers generally. On a close and impartial inspection of this plan it will be found to be simple, economical, and scientific. The designer evidently believes in employing the simple laws and materials of Nature wherever he can to advantage, and he is certainly to be congratulated upon the use he makes of water, which here performs at no expense and in a very superior manner what in many other mines is done at great cost by men, boys, women, and steam-power. As, for example, the hoppers between the tyes, the best hopper, the life bundle, and life racks do the work of a great number of hands in many cases employed in wheeling away the tails, heads, and skimmings, and in hand-buddling, dredging, and racking them. Then there is the facility afforded for washing away the tails of the round buddles, and for saving what tin may be in them, instead of wheeling or tramping away such a mass of sand to some distance, and losing the ore. There is also a great advantage gained in substituting a water-wheel in place of a connection with the engine for working the round buddles, which may be easily extended to the racking of steering keeves (a matter of detail), instead of employing boys. When these buddles are worked by the engine nearly half the tin-dressing hands are knocked idle, and tin is often lost by the changing of a grate, or any other thing requiring the engine to stop. And this alone will amount to no small or unimportant total in the course of a month. Capt. Parkyn obviates these difficulties; his dressing-floor's space will be fully employed even during these stoppages. The supply of water, too, is of superlative importance in the great majority of the mines; indeed, it is hardly possible to have too great a supply if properly directed. From the lack of this in many mines, especially during the summer months, the ingenuity of both managers and men is baffled, so that the stamps can be worked only 12 or 16 hours out of the 24, or it may be, only a part—the crop—of the stuff stamped is treated, which very materially affects the returns, and often involves loss of tin. But the plan under consideration brings all the water used, by a natural and inexpensive way, into one channel, whereby it may be easily prepared for repetition; in fact, no appreciable amount of water need be lost. This, also, is a matter of detail perfectly consistent with the general principles of the plan, and, if my memory serves me correctly, I have seen this plan carried out in some of the mines under Capt. Parkyn's superintendence.

A no less striking and valuable feature of this plan is the early division of the ore—i.e., the stamped stuff containing the different sizes of tin. This is a part of tin dressing which in importance and in the skilful treatment which it requires is decidedly second to no other. Should a dresser fail in his sampling you will, as a rule, discover that this portion of his work is the seat of error. Now, all stamped tinstuff will contain at least three sizes of ore, sometimes called senge, coorer, and frame tin respectively, which require, that all the tin may be saved and dressed, varying, and to a great extent separate, treatment. The plan under consideration appears admirably constructed to meet these conditions. The heads of the tyes, con-

taining, of course, the greater part of the tin of all sizes, is immediately parted from all the other stuff, buddled down, then another separation takes place, and so on, the process being carried on and completed in the tin-house by steering, buddling, and turning principally.

The letters on "Stamps Grates and Tin Stamping," and "Tinstone, and its Size for the Stamps," which followed the plan, are not less valuable, they manifestly being the unadorned, simple, and thoroughly practical productions of a miner. Tin pounded down too low suffers a twofold loss, one in quality and another in quantity; whereas tin not stamped fine enough comes from the grate in an un-solid state, and that part of it saved spoils the sample, and the remainder goes eventually to the country, to enrich, perhaps, some squatters at the company's expense. One is often much grieved, especially in these times when material and labour are so costly, to find upon entering a mine having a battery of stamps of which one quarter part is doing as near nothing as possible, having a blow of 1 in. instead of 8 or 10 in.—and why? Look into the passes and we shall soon discover the reason. "Stones big enough for hedging," the stamps watcher exclaims.

In conclusion, Sir, let me add that whilst the mining public is laid under great obligation to those miners who from time to time favour us with their thoughts upon the great mining questions of the day, it is not less indebted to the *Mining Journal* for the substantial sympathy continually manifested towards legitimate mining enterprise.—April 23. PLUMBUM ALBUM.

DRESSING MINERALS.

Sir,—The letter of Captain Thomas Parkyn, recently published in the *Journal*, is one of the best I ever read, and its contents ought to be known in every count-house and in every mine in the United Kingdom. I find at almost every mine I go to a great desire to put in too large stones. Nothing can be more erroneous, yet two captains said to me the other day that they would like to put in stones of from 3 to 4 in. My reply was that it would be simply a loss of time as well as of power, and that if a mine will not pay to have the stone reduced to about 2 in. cube it will never pay to put in larger. With respect to my patent plan for raising ore, my great object was to give small mines, such as lead mines, a simple mode of crushing the ore as it is raised, so that the rolls should be always at work without the horse turning round. J. WALKER.

James-street, Old-street.

BRAZIL GOLD MINES.

Sir,—Having spent upwards of 20 years in the mining district of Brazil enables me to become pretty well acquainted with all mining movements in that country, and in this case I can hardly help responding to the two letters which lately made their appearance in your excellent *Journal*—one on the 5th inst., and the other on the 12th: the writer of the former signed his name "Anglo-Brazilero," and the latter named himself "One Who Knows the Mines." I think the writers of both letters are well up in Brazil mining, as I see their statements are quite to the point. "One Who Knows the Mines" writes his letter a great deal in favour of Capt. Goyen's plan of inclined planes at the St. John del Rey Mines. On this subject the writer could not speak too highly, as I consider that Goyen's new plan of inclined planes is one of the greatest pieces of ingenious workmanship ever put out of the hands of any mining man. The old mode of drawing stone from the mine was by water-wheels and ordinary kiddles, similar to machine kiddles in Cornwall; but by Capt. Goyen's improved plan they were able to use kiddles to carry a ton. It will no doubt seem strange to many to hear that a kiddle containing a ton of stone could be drawn to surface at an angle of 45° without touching anything after leaving the bottom of the mine until reaching surface, a depth of 250 fathoms, and drawn by a double-acting wheel water power.

Had I been the owner of shares in the St. John del Rey Company at the time the fire took place in the mine I should undoubtedly have voted strongly for Capt. Goyen to have the re-opening out of the mine. The majority of the people at the mine and neighbourhood fully expected that Goyen would have been sent out; but instead of Goyen a stranger was sent. It is stated that the old miners (Brazileiros) at Itabuna de Mottolento say that the present workings by the English at that place are not going in the right direction. In conclusion, I beg to say it is a great pity that so many valuable mines in Brazil are allowed to remain idle for want of workers and a little cash. A ST. JOHN DEL REY MAN.

MINING ENTERPRISE IN THE NEW NORTH-WEST, NEVADA—No. I.

Sir,—Nevada embraces an area of 112,000 square miles, and is in point of size the third largest State of the Union. It is now about ten years since the Territory was placed under territorial Government, and in 1864 she was admitted into the Union. The mineral deposits of this State have been discovered in all the mountain ranges extending through its length and breadth, and are estimated to cover 8806 square miles, whilst fully one-half of a similar space is made up of alkali flats and sand plains. Upon the sierras, which occupy a narrow belt along the western boundary adjoining California, and which there attain an altitude of from 7000 to 13,000 ft., an abundance of timber flourishes, whilst a small quantity occurs now and again upon the mountain slopes. The whole extent of water approximates to 441 square miles, and there is some 75,000 acres of swamp land, which may hereafter be reclaimed and made productive. The mountain system extends in meridional lines from Humboldt northward to Owyhee, and southward to Colorado. The most remarkable feature in the physical geography of Nevada is the uniformity with which mountain and valley succeed each other throughout the entire State, imparting picturesque beauty to the landscape.

In order, and perhaps first in importance, are the Comstock Mines. The yield of the mines has been steadily increasing for the past two years. The Chollar Potosi produced over \$3,500,000 last year, and paid something like \$700,000 in dividends. The Yellow Jacket and Crown Point have been furnishing much reason for encouragement as to their future prosperity, and it is in the latter that the greatest discovery has taken place, for in Crown Point, at the greatest depth yet attained, valuable stuff has been found, which is a striking demonstration of the continuance of the ore-bearing character of the vein. The system of timbering on the lode is considered extremely expensive, it seeming impracticable to renew the same intact without enormous outlay, which will compel the proprietors for many years to keep to the old workings.

In Lander county, at Mineral Hill, a Stetefeldt furnace still supplies a rich variety of stibioferrite ores. Eureka district is classed as the most promising of the State of Nevada. The rapid increase in monthly yield of bullion here assured me that there is an abundance of first-class ore in the district. It is situated about 40 miles west of Hamilton and 65 miles east of Austin, in a rather beautiful spur of the Diamond Mountain range. The prevailing rocks in the district are dolomite limestone, quartzites, sandstones, slates, and occasionally these stratified rocks are capped by a coarse-grained white trachytic tuff. This district compares very favourably with most others in Nevada in regard to the abundance of wood, grass, and water. The first silver was discovered in 1871, lying in the New York and Secret canons, occurring in limestone. The ores in these are sulphates, antimonates, and carbonates of lead, carrying from 4 to 40% of silver per ton. On Mineral Hill, south-west of Buckeye, stibioferrite ores carry much quartz, being rich in silver and gold, and assay from 15% to 150% per ton. There are in Eureka district 16 furnaces, all built upon a generally bad pattern. In Nye county, Silverhead, and Philadelphia district, which attracted so large a share of public attention on both sides of the Atlantic about two years ago, and was shortly afterwards almost deserted, has again commanded the attention of capitalists from the Atlantic and Pacific coasts. Humboldt county, joining Roop county on the east, is traversed by numerous ranges and spurs of mountains, among which are Humboldt, Trinity, Hot Spring, Cottonwood, Goleonda, and Eagle mountains, embracing a valuable agricultural district,

the greater part being watered by the Humboldt. The Central Pacific Railway crosses this country for 200 miles.

It was not until 1870, after the relapse which followed the first mining excitement in the country, that a healthy state of affairs existed (mines only which from the commencement had furnished a sufficiently large return are the only ones which have paid here, for the labour has been excessively high, the carrying freight heavy, and any ores assaying below 40% per ton have not been considered rich enough to be shipped to the nearest market—San Francisco), but now the railway is complete the state of things is very much diminished. The Little Giant Mine, in Battle Mountain district, once attracted much notice, and brought both itself and the district into notice, but here is found a very depressed element. In Copper canon, however, south of Galena, good copper workings have been opened up, yielding a fair return in carbonates, oxides, native copper, and one or two of these are owned by English companies. Echo, situated south of Humboldt district, has attracted the attention of English capitalists, and a London company own a very fair mine here, and are shipping ore via the Central Pacific Railway, which runs five miles from their claim.

Santa Clara, Star, Buena Vista, Sacramento, and Relief districts are quietly progressing in importance, and valuable discoveries are daily recorded. Perhaps the most wealthy may be said to be in Elko county, Elgin, in Lincoln, and Eureka, as before mentioned. Several smelting works are now erected and in the course of construction. There has of late been a new process of treatment of silver ores, which in the judgment of practical metallurgists is destined to revolutionise the mining interests of the State. Nevada is rapidly advancing in prosperity, the surveying operations have been pushed forward with vigour by Congress, and we have now here 960,000 acres thoroughly surveyed, and much of this is excellent agricultural land. In Humboldt Valley and its vicinity the public lines of survey were extended over 1000 miles; on Meggie Creek, south of Humboldt, within the last year the disposal of public land in Nevada under various Acts of Congress amounted to 13,118, leaving yet to be disposed of an area of 67,091,391 acres, including some of the choicest agricultural and grazing lands, and large districts of rich mineral tracts.—New York, March 29. A. G. D. W.

MONSTER SILVER BOULDERS.

Sir,—In the *Journal* of Feb. 22 you make mention of two very rich pieces of ore taken out of the Caracoles Mines, in Bolivia. A boulder was recently found on the surface here which weighs 220 lbs., and which is estimated to be worth between 2000 and 4000 in silver. About two years ago one was found near the same locality, which weighed 11 lbs. 4 ozs., and produced 354 in silver. It is understood that the large boulder above referred to will be sent to Swansea for reduction. M. J. RYAN.

Silver City, New Mexico, March 25.

PHYSICAL GEOGRAPHY OF MISSISSIPPI VALLEY.

Sir,—I beg to forward, for publication in the *Journal*, the following extracts from a lecture delivered before the Iowa Institute of Science and Arts, Dubuque, Iowa:—

The Continent has five natural grand divisions, the Atlantic maritime slope being all that country east of the Alleghany range, and descending towards the Atlantic Ocean, the Pacific slope being country west of Sierra Nevada, the basin of Salt Lake, being the country between the Sierra Nevada and main chain of the Rocky Mountains—basin of the great northern lakes—and centrally situated between these the great valley of the Mississippi or basin of the Continent. Each of these grand divisions has its river, ridge, valley, prairie, and timber system; its coal, iron, lead, copper, and other mineral veins; its mountain system, springs, and altitudes.

METEOROLOGY.—The winds and rains have boundaries, and are controlled by economic laws. The supply of moisture to irrigate the Mississippi basin comes from vapour springs in South Pacific Ocean; there, over a large area, the vapour is continually rising, and is taken by an upper current of air, and wafted across Lower California in the basin of the Continent. When this vapour reaches the eastern side of the Rocky Mountains it is wafted north across the upper part of the valley, turns south-east, and is swept towards Chicago, Pittsburgh, Memphis, and Denver City, forming a vast eddy, of which the City of St. Louis would be near the centre; from this abrasion of the strata for hundreds of miles is seen along the Mississippi river and its branches, from 200 to 1000 ft. having been cut away to form the valleys through which these streams now flow. You may ask why has not the basin of the gulf been filled up with this sedimentary matter? We shall see? The Gulf stream has its spring heads in the Gulf of Mexico, and has for untold ages drawn the sediment out of the Gulf, and transported and spread it over the floor of the Atlantic, and we shall see the same general laws that transported this vapour, in action in the Gulf stream, transporting sediment of this basin to form stratified rocks, and which comes under the head of—

GEOLOGY.—The rock known as the Potsdam Sandstone is 500 ft. below the level of the Mississippi river at Dubuque, in boring an Artesian well in Main-street—first, about 50 ft. of sand and pebbles would be penetrated, then 30 ft. of flinty limestone, 100 ft. of blue limestone, 120 ft. of sandstone, 250 ft. of lower magnesian limestone, which would reach the Potsdam sandstone (Cambrian age), a rock 500 ft. thick, so that 1000 ft. below Main-street would go to the bottom of this rock; what is below this we will not speculate upon, as the mind may have a more healthy employment in investigating what is found above that level. The Potsdam sandstone is a crumbling stratified rock, with calcareous interlining strata, and covers large areas in Northern Wisconsin, Minnesota, and Michigan; the altitude of these districts is 500 ft. above the Mississippi river at Dubuque, making a dip of 1000 ft. this way; this Potsdam sandstone carries a fossil known as a Trilobite, a marine animal that at one age of our globe lived in the waters of an ocean, was laid down upon its floor, and was fossilised in sand and lime that were being deposited, and forming this rock.

We discover from this that at one age of our globe, 1000 ft. below where the City of Dubuque now stands was the floor of an ocean, and from that level, for 600 ft. above the present site of the city, all the rock has been formed atom by atom on the floor of an ancient sea; and from the family of the trilobites, which have their oldest burying-grounds in this Potsdam sandstone, each stratum of limestone and sandstone piled above has its tombs of fossils, showing an outline of the animal life that swarmed these oceans. The blue limestone, of Lower Silurian age, quarried on the opposite side of the river at Dubuque, is a mass of corals and petrified fish, *Orthoceras*, 6 feet in length, being seen in the weather-worn slabs shelving out along the river's bank. At the bottom of this Potsdam sandstone commences the early history of the stratified rocks; and the business of the geologist is to take these strata as the pages of a book, and study out a history of the condition of the surface of the planet, as the dynasties of this animal life made their entrances and exits, each playing its part in the great drama of the early life of our globe. It may be asked how does the geologist know about the depth of this rock below Dubuque and the floor of this ocean, that was 1000 ft. below the level of the Mississippi river, and about this animal life that is buried in the strata, as follows:—In Belcher's well, bored at St. Louis 2200 ft., a scale of the rocks was made from the borings, the bottom of the well being in Lower Silurian rocks; in the Artesian well bored at an insane asylum, five miles from St. Louis, the auger reached a depth of 3800 ft., penetrating a brown sandstone supposed to be of Potsdam age. Going south of St. Louis 90 miles this sandstone is lifted, and abuts against the iron mountains at an altitude of 800 ft. above the Mississippi river; this rock, which is lifted and forms the bluffs on the shores of Lake Pepin (250 miles north of Dubuque), has dipped south and gone down 500 ft. below Dubuque, and going south has further plunged in 3800 ft. below St. Louis, and again comes today at the Iron Mountains.

We might now proceed to trace this rock along the Ozark Mountains, through South Missouri and North Arkansas, through Kansas, where it has gone down 4000 or 5000 ft. deep below great basins of coal measures, and again comes to-day along the eastern flank of the Rocky Mountains. We may come round by St. Paul, and find the

stratigraphical position of this rock several hundred feet below falls of St. Anthony. Pass on to the great trap ranges of Lake Superior, and find this sandstone shingling up these ridges of primary rock. Go to Chicago and find this rock about 500 ft. below the top of the noted Artesian well bored at that city, which reaches 800 ft. deep. At Pittsburgh this sandstone is 3000 ft. below the surface, and find it rising in the Alleghany, and reaching in a long line of Potsdam sandstone in the survey of the geology of that State. Whenever this rock comes to the surface or crops out along the shores of our globe is found in his tomb of lime and sand, probably embalmed his remains by a process far superior to that used to preserve the Egyptian kings, now the dried mummies of that coast to the Mississippi river has cut its way down in this rock 200 ft. below Lake Pepin, and coming south the strata exposed in the bluffs newer, and gradually shingle over this rock. It may be asked what was the condition of our globe at the time these trilobites lived? It was the condition of an ocean that had its floor 1000 ft. below the present site of Dubuque, and 4000 ft. below the present level of the Mississippi river at St. Louis? We must suppose that this ocean being supplied with sedimentary matter by rivers that transported the wearing down of the rocks of continents, similar to the present now daily being carried out of the mouth of the Mississippi, Rhine, Amazon, and other rivers that are carrying out sedimentary matter and spreading it over the floors of our present oceans. It is known that the central part of the Atlantic Ocean is a plain covered with about 1500 ft. of water, that the deep waters of the coast follows a valley 100 miles wide and 7000 feet deep. Beyond this rises the plateau, which extends within 200 miles of the present coast—this Gulf stream is a river in the ocean. At the end of this great valley we have the great banks of Newfoundland, and it is probable that part of the abrasion of the strata to form the topographical system about Dubuque has been carried out of the mouth of the Mississippi, drawn in the Gulf stream, swept west, and the heavier portions deposited to form these banks, while the finer and lighter material was carried out in the vast eddy formed by the ocean currents in the central part of the Atlantic, and was deposited in comparatively still water, and in this way was formed the plateau known in maritime physical geography as the gossa Sea.

I will now ask you to go in imagination with me back to the time when the deep cuts were being made by the Mississippi river in Lake Pepin in this Potsdam sandstone, and we shall see the sedimentary matter that was being carried out of the Mississippi river and by the Gulf stream was principally sand—the proper material to form on the floor of the Atlantic a stratum of sand. Suppose we consider this sedimentary matter about the time Niagara and galena limestones were being cut down between Sinsinawa Mound of Wisconsin, six miles east of Dubuque, and table lands of Iowa, six miles west of the city, 600 ft. deep line where the river flows, have been removed, and we shall see the Gulf Stream would be carrying out the proper material to form down a stratum of limestone on the floor of the Atlantic. At the time the coal measures were being abraded along the Mississippi river from Rock Island to St. Louis, the Missouri and Ohio rivers where they cut through the great continental coal fields, were carrying out the sedimentary matter and supplying the Gulf stream material to lay down a stratum of shale on the floor of the Atlantic. The commonly received theory of geologists is that all the phenomena seen in a study of the rocks have been produced by causes in action, and we here see acting on a grand scale the same cause that may have prevailed when the present rocks of the Mississippi river, from the Potsdam sandstone upward, may have been laid down on the floor of an ancient ocean. Suppose the present level of the Atlantic should be raised 2500 ft., and we have a table land 1500 miles wide, formed of sandstones, shales, and limestones, and 1500 feet altitude above the ocean, and surrounded by deep valleys which are now the valleys of the Gulf stream. Here we see the material out of which may be founded a new continent. Suppose this table of rock commences to be abraded to form hills and ridges, and the sedimentary matter worn down from the hills deposited in these seas, that they are gradually filled up, and vapour showers and storms, originating under the action of economic laws, receive their supply, and carry on the system of irrigation this basin, so that all the rain water precipitated on the dryness of Dubuque has risen from a great vapour spring in the South Pacific Ocean, has been wafted by upper currents of air, has been carried clouds, and by the operation of positive and negative forces irrigates the fields of the farmer. Of this water part is evaporated by heat of the sun, part percolates down through the clays, and rocks, forming the supply of springs, and part is taken by the myriad spongioides, forming the mouth at the end of the stems of plants, and is used to supply the circulating system and build the structure of trees and grasses; part finds its way at once into the rivers, and flows out of the mouth of the Mississippi river, carrying out millions of tons of sediment daily that has been worn down from the soils, clays, and rocks, and this process has been going on from the old ages, even back to the time when the Niagara limestone (the Silurian) lay in solid strata from the top of Sinsinawa mound of Wisconsin to top of table mound of Iowa, and the surface of country 600 feet above the present level of Main-street, Dubuque, was a salt water of the seas by continual dilution of the streams from land loses its saltiness, and these seas become lakes, that these lakes swarm with animal life, that the remains of these animals are found in these fresh water deposits, and form what is known as a tertiary sin—a name applied to recent deposits of clay, sand, and shells, and following out this train of reasoning we shall be directed to an examination of what is known as the tertiary basin of Nebraska—called by the pioneers *Mauvais Terre* (the "Bad Lands")—a north and south range of country, filled with the bones of the gigantic animal life that existed on the globe a short time prior to the advent of man; the associated and buried with the shells and animal life that swarmed the waters, demonstrate almost beyond a doubt that this tertiary basin was the course of the Gulf Stream that carried the sedimentary matter that was spread over the floor of an ancient ocean when was deposited the Potsdam sandstone and the present shales, and sandstone to the thickness of 5000 ft. above the present bed-rock of the Mississippi basin.

In that early day navies did not ride upon the bosom of the deep to founder and go down with their armature of war upon the floor of that sea, as would be found by the future inhabitants of the globe should the basin of the Atlantic become dry land. The microscope has revealed to the eyes of the astronomer solar and stellar systems by which the mind in contemplating is carried up to a comprehension of the power and wisdom of the Creator of these worlds. The microscope has revealed in a single drop of water wonders that equal the mysteries of the planets—so in geology the smallest spring branch has its little eddies, and carries down to the bottom of the sea its load of lime and sand, and makes its little platform of stratified rocks where in a few feet square can be read a history of all the principal phenomena of the great rivers that have abraded the valleys of continents, and spread the sedimentary rocks. We discover the floor of oceans, in that way forming stratified rocks, by these facts that the limestones which we now call the lead-bearing rock, or lead measures, and which show vertical sections of the rise at, above, and below Dubuque 200 ft. high, did not have their existence until long periods of time had elapsed, after the Potsdam sandstone was formed. That the lead ores had not yet been lifted in veins when the rocks laid in solid strata from the top of the Sinsinawa mound and valley and ridges of Iowa to the top of the Sinsinawa mound and valley and ridges of Wisconsin; that after this the crevices and Plateau system was formed, and we may suppose that the lead-producing action dates at a comparatively recent geological epoch, from the simple fact that there was no necessity for the existence of the lead-bearing man had come to have dominion on the earth, and to be conditioned with a mind and wants making a necessity for the existence of the metal, for to have replenished the veins prior to this period would have been consistent with the general development or plan of the

About 12 months ago I, with a staff of men, was at Wheal Mary Louisa Mine,

heaving, out the engine-stamps and other materials that the Vincent Company purchased of the former for 1400l. Since that time they have been sent to the mine, engine-house built, 22 heads of stamps erected, floors laid out, burning house built, pitwork fixed, mine forked, &c., 28 tons of tin already sold, and about six more ready market, which makes 34 tons in such a short space of time. So much for Wheel Vincent, and for the energy of the agents! Judging from present prospects, as soon as the mine gets fairly developed, and returning power increased, it will be a source of no small value to the county. JAS. DEBBLE.
Harrowbarrow, St. Mellons, April 23.

TERRAS MINE.

SIR.—With a flourish on the proverbial conventicle penny trumpet, Mr. R. Symonds did this round old world the honour of making his bow to it in the columns of your last week's edition. Pray allow me, an ancient reader of the *Mining Journal*, a similar privilege. Mr. Symonds's letter, headed as above, opened with the dictum in parenthesis—"And every man is bound by a Divine law to love his neighbour as himself." Of course, this obligation is undeniable; but, alas! the good words were no sooner uttered, coupled with a lamentation over the sins of the promoters of Terras and the sorrow of the shareholders than the moralist flew off at a tangent, and in full proof that pharisaical Christianity does exist *de facto*, fixed his fangs to the quick in his neighbour, "a broker charity does exist," who came out of Nod's Ark, and had the audacity to make money by purchasing Terras shares on their merits, and upon the same principle actually advocated them—mind, for their intrinsic value—in the open market. With the results of such speculation no person has a right to interfere, particularly as the broker referred to purchased the stock at his own risk, and, fortunately for him, parted with them at a profit. And here I venture, with regard to the mine itself, to affirm that were it now placed under more active and practical management, it would at a given time recoup all the losses of its investors, for there exists not a shadow of doubt that it possesses large deposits of tin. However, with philosophers like Mr. Symonds, who believe in their own unimpeachable infallibility, it would be loss of time to attempt any extenuation of the errors of others. Terras, he holds, was not worked in a proper manner. Perhaps not, according to his manner of thought and action; nevertheless, people must not forget that he who sits in judgment on the question is not a miner but a mapist. As a mapist, and so he traces of mineral lodes, Mr. Symonds affects marvellous superiority, and so he is caught, for it is suspected that some of these lodes found on certain hills are so deep set in the folds of the earth that, unless there occurs, happily for the prosperity of mankind in general, a series of terrestrial convulsions, their precious products are likely, through all generations, to be considered as buried treasure.

A word now, Sir, on the rude personalities too often introduced into mineral discussion, as exemplified by Mr. Symonds's sympathetic epistle. Where such are indulged in retorts are sure to come. What if the broker of Gracechurch-street were to allude to the antecedents of a dogmatist and pencil personage? But, in the interest of legitimate mining, it is right to ask Mr. Symonds if he is aware that his neighbour's advocacy of Terras shares has been authorised unequivocally by the returns made by the mine during its 24 months' working. Be it known to him now that, in the face of the usual disadvantages of clearing away profitless ground, and those arising from inadequate machinery, Terras yielded 57 tons of tin, which realised 90l. per ton. Not so like a myth after all! Here it will not be out of place to hint that possibly the Terras Mine Company may have ere this discovered that they in an hour mistook Gresham House for No. 85, Gracechurch-street, and the broker so kindly distinguished by Mr. R. Symonds would have given the directors a guarantee to place the whole of the 2000 shares available within a month; failing which, such a man and his confidence in the undertaking, he would have given his cheque, or any balance of shares which should have remained unappropriated. Look on this picture and on that. Had such an arrangement come to pass how different would be the present position and prospects of Terras Mine.

I shall not stop to weep in a vain lamentation with the Jeremiah of mapists, Mr. Symonds, on even the fatal mistake thus illustrated. Better times may come. Awaiting them, I beg to impress on Mr. R. Symonds that our national mining interest has been more injured by its glib, chattering, good-natured "friends" in a month than by mining market parties in a decade of years. Finally, when I come to consider that the gentleman "who came from Nod's Ark," and is now established in Gracechurch-street, spends yearly some thousands sterling in the purchase of mines, making returns of the various ores, I wonder how even the jealousy of even the gentlest of mapists could resist itself against him. But some men are too small to see afar. It is now held that the "spots on the sun" are for the most part mere reflections on faults of human vision than to flaws in the solar system. J. J. J.

FRANK MILLS MINE.

SIR.—It is stated in the "Standard" of the 14th inst. in last week's *Journal*, that upwards of 100 tons of sulphur can be raised from the mine weekly, whereas Capt. John Cornish, P. Cornish, and N. Adams positively assert that with their present appliances they are prepared to raise 200 tons of ore per day, or 1200 tons per week. It will, therefore, be essential in calculating the profits to be derived from this source to add 50 per cent. to the totals—and thus in No. 3 remark the profit from iron ore should be 600l. per week in place of 400l., and 21,000l. instead of 20,800l. per annum—a very important difference. Again, should the white iron ore spoken of prove to be worth 75s. per ton profit (not an unreasonable price, surely, in the present times, it must follow that instead of a total of 117,000l. we have 50 per cent. added—173,250l. per annum. It may be justly observed that the public never buy unless a share or stock is very high; the acute speculator, however, acts on a contrary plan, and astutely buys when they are low. No doubt rests in the minds of all interested in the future of Frank Mills but that now is the time for the mine to step out to the front, and once more enter the Dividend List, certainly with a double probability—may, certainly—of success, and on a more solid basis. Enquiries are being already made on the markets for the shares. Of course, the prospect of getting rich in lead ore is totally without respect to the former product. In fact, there is a magnificent iron mine at once, with the advantages of discovering lead in the interim of working the iron ore. The mine employs 13 hands, and the yearly expenditure is marvellously low. In the 100 north the iron ore appears to be getting more thickly impregnated with lead ore—a very favourable and important indication. Large quantities of white iron ore are already drawn to surface, and it is stated to be of good quality. Orchard air-shaft has been repaired where slightly injured by fire. I trust to be able to send you some splendid news of this mine within a fortnight. J. J. J.

FRANK MILLS MINE.

P. S.—In the event of this mine being registered on the Limited Liability Principle, great advantages will accrue to holders of these shares at this time, and it is more than probable that, in addition to a cash balance being raised (hardly needed, however), the shares will be more readily purchased by timid speculators prejudiced against mines liable for calls.

FRANK MILLS MINE.

SIR.—I have observed the remarks of "Senex," "Fides," and others in the *Journals* of April 5 and 12, and am glad to find that some of my co-adventurers have at last arrived at the conclusion that they have a valuable property. I quite believe that better days are in store for us, and at no very distant period; but let us have a little patience—the mine only ceased to pay dividends in August, 1870, and only three calls have been made since that period, and in return we have an enormous mass of sulphur ore. The agents who inspected this property a short time since all agree that the quantity discovered is somewhere about 200,000 tons, and that from 500 to 1000 tons per week can be returned without any additional machinery. If this be true, and I have no reason to doubt it, we have the most valuable iron mine in the two counties. INVESTOR.

FRANK MILLS MINE.

SIR.—As lead mines are now becoming so favourite a channel for investment, I think a word or two in commendation of the above property will not be out of place. The fact of lead being remarkably high, and likely (we hear on all sides) to go higher, ought to attract the attention of speculators to this mine, which it is believed will become very profitable shortly. These shares ought to come into request, especially as it is anticipated that lead will be cut into large chambers under the newly-discovered beds of white iron ore. A further inducement to buy and lock-up these securities rests in the fact of the greater riches found in this enterprise in unlimited quantities—I refer to the white iron, which can be easily brought to surface for a mere song, at the rate of (say) 1000 tons per week, large quantities having been brought up to the mouth of the shaft—indeed, it is computed that more than this stated number of tons can be raised weekly. Here we have at once a large source of income, at a low computation we might venture to state 1000l. to 1200l. weekly. It appears to me, however, to be merely a question of carriage. Can any of your readers tell us when the Teign Valley Railway will finish this line passing Frank Mills property? It is expected that information will be shortly promulgated concerning this mine which will prove it to be one of the best investments of the day. I am now in a position to declare without doubt the white iron ore is very valuable, and, therefore, what I now state will come to pass in respect to the enormous dividends shortly at hand. EXPECTANT.

FRANK MILLS MINE.

SIR.—I am in receipt of a circular from our purser, Mr. Penrose, and I would strongly advise time to call a special meeting of the adventurers, to be held in such a place as to make it convenient for most of the adventurers to attend. I remember once being present when it was suggested to sell the mine as a going concern, and let it be started again by a new company. This can be so arranged that the greater part of the present adventurers may enter the new concern, and work in this mine. No doubt some of the out-adventurers feel surprised to see the shares sometimes almost giving away, and then at once rise to 22l. or 25l. per share. Now, if this meeting is called in such a place that these as well as many other important matters may be gone into and explained, everything must then go on in a very satisfactory manner; and, judging from the manager's and several other reports of those who know the mine well, there is no reason why this shall not soon become as good a mine as its neighbour, West Basset. I trust that the adventurers, as well as the purser, will give this due consideration, and that such meeting will be shortly convened. We may rest assured neither of the mines adjoining the West Basset will go to "Law" until the new patent dial comes in use, and the agents made fully acquainted with its value. J. J. J.

FRANK MILLS MINE.

SIR.—Having just returned from a visit to the Penrynshire Lead Mine, near Holywell, I cannot forbear wondering that none is made of this mine than at the present time, for I know very few lead mines where the chances of great success are so excellent and so numerous. There are five or six west and east master lodes, with a fine "flat" or horizontal tributary traversing the set. The mining ground is so extensive that there is afforded not only a good length on the course of the lodes, but a width so large that a great portion on one side might be re-let to another company. A new lease for 21 years, I hear, has just been granted, on favourable terms. A sample of ore has also just been sent to market, and another is in the course of preparation. In fact, the prospects of this mine are such that the shares ought to be three times their present value. With your permission, for the sake of the present shareholders, I will return to this subject. J. J. J.

FRANK MILLS MINE.

[For remainder of Original Correspondence see to-day's *Journal*.]

The Prize Essay—Practical Mining.

No. V.

PULVERISERS.

It has long been a question with those engaged in the dressing of tin how to deal with the "roughs" or "rows." In stamping them a second or third time a great amount of power was expended to produce very little effect. To obviate the necessity for this pulverisers have been introduced for grinding the "roughs" to a fine powder. A great number of machines have been introduced for this purpose, but we shall refer only to the two most recent—those of Dingey and Stephens.

Dingey's Pulveriser.—The great demerit of former pulverisers was the tendency in working to wear into grooves. This is entirely obviated in this machine, as the grinding surfaces are continually changing their relative positions. It is equally well adapted to the grinding of copper and lead "skim ings" as tin roughs, and there seems to be no question of its effectiveness. A machine with 4 discs 2 ft. in diameter, 1½ cwt. each, revolving in a 6-ft. dish, reduces 18 tons of average mine roughs in 24 hours, and requires a 10-in. cylinder-engine to drive it. The wearing parts are easily replaced. One of these machines has been at work at Wheal Jane very successfully for nearly two years, and another has recently been erected at Botalack. Maker, Mr. Francis Dingey, Truro Foundry, Truro. Price, 150l.

Stephens' Pulveriser. This machine was first set to work at Wheal Fortune, at the patentee's expense, and was highly approved of by all who saw it in operation, and pulverises 2½ tons of average mine stuff in 24 hours, with 1-horse power for driving it. It is fitted with a self-acting feed arrangement for regulating the supply to the grinding-pan. The tendency to wear into grooves is obviated by giving the upper plate considerable lateral play, and by the insertion of pieces of oak in the bottom, driven endways, which fairly distribute the stuff; provision is made for preventing the stuff from being carried round in the pan. The wearing parts are very durable and easily replaced, and the simplicity of the machine enables any ordinary stamps boy to attend to it. This pulveriser is at work at Wheal Providence, Roswall Hill, St. Ives Consols, Wheal Fortune, Spenn Moor, and other mines. Patentee, Mr. Samuel H. Stephens, Lelant, Cornwall. Sale makers, Messrs. N. Holman and Son, Saint Just, Penzance. Prices, a 3-ft. machine about 30l.; 4-ft. ditto about 45l.

SEPARATORS.

These are used in some mines for classifying the finer from the rougher ores previous to their treatment by buddles or frames. Several kinds are in use, made generally of cast-iron; usually they resemble a funnel, with an adjustable plug in the bottom.

BUDDLES.

One of the most modern improvements in dressing is the adoption of the round buddle. Though in universal use for tin-dressing, it is equally adapted to the treatment of other ores requiring to be stamped. The square or rectangular buddle has largely gone out of use in the West of Cornwall, machinery necessitating the change of form, and at the same time dispensing with much manual labour, but it is still retained in the mines of the central and eastern districts for the later processes of tin-dressing. The buddles most generally used are the central cone or convex buddle, and Borlase's concave buddle.

The Central Cone Buddle. This buddle was the first circular buddle introduced, and has undergone considerable modifications, but principally in the size of the cone. In some instances a revolving plate was placed on the top of the cone, but this has been now discontinued. As now constructed, the buddle is admirably adapted to the dressing of tin, and is very generally used. It is convex in form, and about 20 ft. in diameter, and the cone about 6 ft. The Dwarf Wheel Buddle is merely a modification of the above, consisting of an automatic arrangement for driving the buddle by passing the stuff to be buddled over a small water-wheel. The above buddles are fed at the centre, and the inclination varies with the quality of the stuff. Makers—any of the Cornish founders supply the iron-work and necessary gearing.

Borlase's Patent Concave Buddle. This machine has been in use about 12 or 14 years, and it is used in a great number of mines. It differs from the central cone buddle in being concave; the stuff being delivered at the circumference flows toward the centre. The inclination of this buddle also varies with the quality of ores to be treated. Patentee, Mr. Thos. Borlase, Highway, Redruth, Cornwall. The above buddles were usually constructed of wood, which was prepared on the mines, but recently Portland cement has been substituted for wood to a great extent.

Opinion seems divided as to the respective merits of these machines.

SHOVELS, BARROWS, &c.

The shovels in constant use on dressing-floors are similar to the ordinary mine shovels, but small hand-barrows are used in the removal of ores where it would be inconvenient to use wheelbarrows. The largest sizes are used in the weighing of copper ores, &c. They are made on the mines, and the cost of the usual size is about 6s. Wheelbarrows are also very considerably used in dressing. Bass brooms are in common use, and vary in price from 1s. to 1s. 6d.

MACHINES AND TOOLS FOR TIN-DRESSING IN ADDITION TO THE ABOVE.

TRUNKS.

These are now but seldom used, being superseded by frames and buddles.

FRAMES.

These are either moveable or fixed wood tables for the treatment of slimes or for fine tin. Some years since they were in some instances superseded by buddles, but are now being again generally used. They are usually made on the mines, and vary in size from 6 ft. to over 12 ft. in length, and 5 ft. to 6 ft. in width; their length and inclination depends on the quality of the stuff to be treated.

KIEVES.

These are used in the separation of fine tin and refuse from the rough tin in the operation of packing and stirring. They are supplied at from 11d. to 1s. per inch of the diameter. In replacing hand labour by machinery its application to the operation of packing and stirring has not been overlooked; several contrivances having been effectively adopted for this purpose very economically. These arrangements vary in different mines according to the ideas of the engineer.

Tubs, Horns, Ladles, Syphons, &c., are sundry small tools used for conveying water, &c., washing frames, and emptying kieves.

Horse-hair Sieves are used for cleaning rough tin. Price, 10s. 6d. each.

CALCINERS.

These are used for roasting tin ores to get rid of substances which from their specific gravity cannot be removed by washing. In the operations of roasting and decomposing their volatile substances, as sulphur and arsenic, are driven off, leaving the remaining impurities in a state easily to be removed. The calciners we notice are

BRUNTON'S, AND OXLAND AND HOCKING'S.

Brunton's calciner consists of a circular table, usually from 12 ft. to 14 ft. in diameter, covered with fire-brick, and which revolves three or four times an hour on the hearth of a reverberatory furnace. The ore falls from a hopper upon the centre of the table, where it is distributed and turned over by the flukes working near the bed, the ore gradually being carried from the centre to the circumference. A regular feed is ensured by the shaft carrying the table passing through the hopper. It is generally driven by water-wheel when available. There is another calciner similar to this, the difference being that the shaft does not pass through the hopper, the feed being supplied by an attendant. Makers, Messrs. Williams' Perran Foundry Company, Perranarworthal; Messrs. Harvey and Co., Hayle;

* It is suitable for pulverising all partially stamped ores, and is so portable that it may be removed entire if required.

Messrs. West and Sons, Saint Blazey. Prices of the ironwork with-out masonry, 14 ft. bed, about 230l.; 12 ft. bed, about 190l.

OXLAND AND HOCKING'S PATENT SELF-ACTING CALCINER.

This calciner consists of an iron tube, or cylinder, about 4 ft. diameter and 30 ft. long, lined with fire-bricks placed on edge, leaving an internal diameter of 3 ft. 3 in. It is set at an inclination of from 1 to 1½ in. per foot, varying according to the nature of the ores to be operated on. On the outside, and fastened to it, are three iron rings, on which the tube travels over three pairs of rollers, by which it is supported. On the side of one of these rings are cogs, by which rotary motion is imparted by suitable machinery. The fire passes from the fire-place, over a chamber, into and through the tube, and on into flues covered for a short distance with iron plates, on which the damp ore is dried before it is admitted in a regular steady stream through a tube into the back end of the calciner.

The slow revolving motion of the tube causes the steady advance of the ore by its own gravitation as it undergoes combustion. In the interior of the tube projecting ledges lift the ore some distance above the sole of the furnace, and it then falls through the passing current of heated gases. At the back end of the tube "baffle" plates of fire-brick prevent any escape of ore into the flues, and the calcined ore is discharged into the chamber between the fire-place and the front end of the tube. The following advantages are claimed:—Simplicity of construction, and, consequently, low prime cost; durability and small expense for maintenance; efficiency and rapidity of action; economy of fuel and labour, and non-liability to derangement, none of the working parts being exposed to the action of the fire. These calciners are at work at Devon Great Consols, Carn Brea, Wheal Basset, Wheal Jane, and other mines, and the fullest particulars can be obtained of the patentees—Mr. John Hocking, jun., Redruth, or Dr. Oxland, 8, Portland-square, Plymouth. Sole makers, Messrs. Williams' Perran Foundry Company, Cornwall. Prices, 200l. and complete with the necessary masonry about 450l.; royalty.

The amount calcined per day in each of these calciners must of necessity depend upon the nature of the ores. They are both highly spoken of by those who use them, though at Wheal Jane, where both machines are at work, preference is given to that of Oxland and Hocking.

Several small tools are in use for sampling, such as crucibles for calcining, hammers for reducing the samples, shovels for vanning, scales and weights for determining the value.

MACHINES AND TOOLS USED ONLY IN COPPER AND LEAD DRESSING.

CORRING HAMMERS AND BUCKING IRONS.

The former, in various sizes and weights, are used for reducing or preparing ore for the crusher. The latter are used for preparing ores for the market.

CRUSHERS.

These are used for reducing ores to the required size, either for the jigger for further dressing, or directly for the market, and have superseded hand labour in the use of the bucking iron to a very large extent. This ore is placed in a hopper above two revolving rolls, usually of best cast-iron, and of varying lengths in different machines, and with a diameter of from 18 in. to 24 in. After going between the rolls the ore passes into a cylindrical sieve below, which also revolves, allowing the finer portion of the ore to pass through, whilst any portion not crushed small enough runs down the sieve, which is on an incline, into a raff wheel, which raises it to be again thrown into the hopper and further crushed.

The sieves are of iron wire, with holes of varying size according to work. These machines are extensively used for the crushing of copper and lead ores, and are generally driven by steam. In the West of England only two rolls are employed, while in the North of England as many as three pairs are employed for reducing to various degrees of fineness. In shape the roll resembles a cheese, but with a flat rolling edge. The usual quantity crushed by two rolls varies from 20 to 30 tons per day of 10 hours. Makers, Messrs. Williams' Perran Foundry Company; Messrs. Harvey and Co., Hayle; Messrs. West and Sons, St. Blazey; Messrs. Tuckermill Foundry Company, Camborne; Messrs. Tangey Brothers, Cornwall Works, Birmingham. Messrs. Sandycroft Foundry Company, near Chester.

Prices, without engine:

Diameter of rolls.	Breadth of rolls.	Price.
18 in.	12 in.	£117
21 in.	14 in.	154
24 in.	16 in.	195
30 in.	18 in.	250

The prices of the rolls are—cast-iron, 18s.; cast in chills, 18s. per cwt.

JIGGERS.

These are used for separating the refuse from copper or lead ores. The present hand-jigger is a great improvement on the old jiggling sieve. They are sometimes connected and worked by machinery. The bottoms of jiggers are either copper plates holed or wire interwoven, the size of the holes depending on the ore to be treated. Copper bottoms are supplied by Mr. Launder, Redruth; wire bottoms by Mr. G. Arnall, Redruth; Mr. T. Arnall, Redruth; Messrs. J. and F. Pool, Hayle. Varieties of jiggers are supplied by Messrs. Kember and Co., Drummond-street, London.

IRON OR BRASS SIEVES, OR RIDDLES.

These are used for riddling or classifying the ores, and are made with iron or brass bottoms. Iron sieves, 18 in. to 19 in. diameter, with holes varying from ½ to 1½ in.; brass sieves from 3 to 6 holes to the inch.

Strakes, used for washing slimes out of the ores; *Scrapers*, made of iron, for clearing the refuse from the jiggers; and *Strikers*, made of wood, for removing the surplus ores from the barrows in dividing.

MINERAL DRESSING MACHINES.

Several patents have at different times been taken out for complete systems of dressing apparatus, some claiming applicability to the dressing of metalliferous ores generally, and others only for ores of a particular class. We notice the following—Messrs. The Self-acting Mineral Dressing Company, Mr. T. Borlase's Patent Metallic Ore-Dressing Machines, Capt. Boy's Tin-Dressing Machinery, Messrs. Kember and Co.'s Ore-Dressing Machinery; Collom's Patent Automatic Ore Washing Machines.

The Patent Mineral Dressing Company state that they have perfected a system of dressing arrangements which are completely self-acting, and suitable to the dressing of all kinds of metallic ores. They have been principally introduced into copper and lead mines in Wales and the North of England. A set has been erected at Wheal Arthur (Cornwall) for dressing tin at Phenix, and Mr. West has introduced the company's side percussion table. We deem it unnecessary to give any description of the machinery, as the company have published a pamphlet containing full particulars and illustration, which may be had on application to Mr. George Green, Engineer, Aberystwith; or Mr. T. Currie Gregory, C.E., 62, St. Vincent-street, Glasgow; or to Messrs. Williams' Perran Foundry Company, who are now executing a set of the company's machinery for Sardinia; and Messrs. West and Sons, Saint Blazey, who have both obtained licenses to manufacture the whole of the machinery.

Mr. Thomas Borlase, of Redruth, has patented a metallic ore-dressing machine, which is being manufactured by the Tuckermill Foundry Company. This machine was first erected for trial at North Roskear Mine and gave general satisfaction, and led to their adoption in several mines of the county. We understand the makers have to extend their premises in order to meet the demand for these machines. Illustrative descriptions may be obtained from the makers. Price of machine 24 ft. diameter, with overhead span beam and semi-circular waste launder, exclusive of receivers and hatches or pits, capable of dressing the work from 12 stamps heads, 62l.; price of machine, 20 ft. diameter, capable of dressing the work from eight stamps heads, 45l.; price of machine, 16 ft. diameter, capable of dressing the work from four stamps heads, 40l.; royalty, for one machine, 1l. per month; two to four machines, 15s. per month each; five machines and upwards, 10s. per month each. Favourable testimonials have been received from the agents of the various mines where the machines are at work, but at South Crofty they have been laid aside.

Mr. Borlase has also patented a calciner and two forms of pul-

It was to find seam tin; in searching for a lode a somewhat different plan was pursued. The miners had a theory that the Flood moving from east to west had carried the shode from the lode in that direction, and acted accordingly. Guessing at the place whence it was broken off they sunk a shaft 7 or 8 feet deep, and if the lode were not found they tried again. "By this shaft they also discern which was the quick ground (as they call it) that moved with the flood, and which the firme in which no such *shode* doth lie. If they misse the *lead* in one place they sincke a like *shaft* in another beyond that, commonly farther up towards the hill, and so a third and a fourth until they light at last upon it." Costeating was an economical development of this process. The downward rock was introduced into the country by means of a small cart, the *framed* Cornish Ribbera. Mr. W. Hest next describes the transition from open workings, to *shawmelling*, and thence to shaft mining; and mentions that for both systems of stoping, the under and the over hand, Cornishmen are indebted to the Germans. The latter was of very recent introduction, as was shown by Mr. W. Jory Henwood in his address to the members of the Royal Institution of Cornwall in 1869. The advantages of overhand stoping caused it to be rapidly adopted; but the old method of working was continued in Wheal Alfred so lately as 1816, and is still followed occasionally now.

Passing from the mines themselves to the details of their working, Mr. Worth

remarks that the development of the mineral resources of the West of England has been governed by three sets of conditions—the tools used, the machinery employed, and the introduction of the principle of association as affecting both labour and capital. The tools, the introduction of blasting, and the trials of boring machines, &c., are in turn referred to. In the introduction of improvements in mining processes Cornishmen appear to be departing from their old principle of keeping half-a-century in the rear. In Germany back stopes had existed as early as 1730, but their first appearance in Cornwall seems to be at Dolcoath, about 1782. Blasting was applied at Freiberg in 1610, but it was not until 1870 that it was employed in England. Boring machines have long been successfully used in Germany and America, and are only just beginning to receive attention in Cornwall; and Cornishmen are indebted to Germany for the man-engine, which was introduced into Cornwall by Mr. Mitchell Loan some years after its application in Germany. In the introduction of the stone-breaker they have been much more energetic, for Mr. Worth states that Blake's stone-breaker, shown at the Polytechnic Exhibition in 1865, is already "used in a few Cornish mines instead of spalling." The questions of ventilation and lighting mines, of dressing tin, copper, and lead ores, precipitation, carriage, and smelting are carefully discussed; and he concludes with summaries of the wages of working miners, and upon the sale of the ores.

The paper has evidently received a very large amount of attention in its preparation, and Mr. Worth appears to have taken especial care to quote none but the best authorities, and the most reliable particulars furnished by them.

GEOLOGY FOR SCHOOLS AND STUDENTS.—The study of geology will be much facilitated by the consultation of such charts as that just completed by Mr. H. W. Bristow, F.R.S., F.G.S., the Director of the Geological Survey of England and Wales, and issued by Messrs. Chapman and Hall, of Piccadilly (the publishers to the Science and Art Department), under the title of "Table of British Strata, showing their Order of Superposition and Relative Thickness." The name of the author is a sufficient guarantee that full reliance may be placed upon the accuracy of the chart, and with regard to its character it need only be mentioned that the epoch or periods, systems, and series are clearly and graphically shown, the necessary names added to each. The whole chart is executed in the best style of chromolithography by Vincent Brooks, Day, and Son, and will no doubt be very largely used for teaching the elements of geology, and for impressing the leading facts of the science upon the memory of those who study it.

GUIDE TO HEALTH.—An interesting little pamphlet under this title, containing advice and instructions for the cure of nervous debility, has been published by Mr. HENRY SMITH, M.D., of Jena. He states very truly that the head too frequently is permitted to absorb all the vitality of the body, and, consequently, recommends sufficient bodily exercise and recreation, early rising and early retiring to rest, and abstinence from all excesses. If these recommendations be adopted and persevered with but few will have necessity to consult a medical man; but as all persons have not the power or inclination to follow them, Dr. Smith devotes a portion of his book to showing that he has been most successful in the treatment of various classes of disease, and that his system of treatment has given his numerous patients much satisfaction. Dr. Smith does not rely solely upon the medicaments included in the British pharmacopoeia, and appears to place much confidence in the popular vegetable remedies of America. His pamphlet will, no doubt, be extensively read.

Meetings of Mining Companies.

AUSTRALIAN UNITED GOLD MINING COMPANY.

A general meeting of the shareholders was held at the offices of the company, Austinfrs, on Wednesday.

Mr. E. W. WINGROVE in the chair.

The report of the directors stated that they have deferred holding a general meeting, partly owing to the absence of proper accounts from the colony, and partly in the expectation of being able, after some delay, to lay before the shareholders a satisfactory report. Mr. Kitto is shortly expected in England, and the shareholders will doubtless look to him to explain the cause of the numerous disappointments, particularly as to his more recent reports. The shareholders may consider it encouraging to learn that from the Central Mine there have been raised 32,458 lbs. of wash dirt, yielding 2101 ozs. 19 dwts. 13 grains of gold, and realising 1068. 8s. 11d.

The CHAIRMAN said that Major Jelf Sharp solicited the indulgence of the meeting for his absence from the chair, having been suddenly called away to Scotland on domestic matters. The voluminous extracts appended to the report from the advices received from the colony made the shareholders so conversant with the position of the company as to render it very needless for him to dwell upon the numerous promises held out, or to point out how few of them up to the present time had been realised. It is a matter of disappointment to the directors, who have every confidence in Mr. Lamb, that the promises made in the reports published mail after mail had not been realised, still he thought the prospects of the Central Mine far from discouraging, although more capital will be required to develop it. The following telegram has just been received from Mr. Lamb:—"Melbourne, April 17: Telegraph that you will remit 10000 first mail, or Central will be sold off, just as splendid prospects obtained from New Gutter." The latest advices are dated Feb. 25, and the telegram some six weeks later, and the only conclusion is that the gold returns in March were again unsatisfactory, and that Mr. Lamb had exhausted the accommodation that the bank had afforded him, and that it was putting pressure upon him. The balance-sheet shows that the funds are exhausted, but there is due from Mr. Kitto 10000, on account of his preference and discount shares he had applied for. It would become necessary at this meeting to consider what steps should be taken to avoid the catastrophe threatened in the telegram. As explorations have been in progress, it is thought these "splendid prospects" are in the main eastern gutter, which of itself makes it a point of very material importance. The telegram came from Mr. Lamb, a gentleman of honour and probity, and whose *bona fides* are everything that can be desired; and it will be a thousand pities if, after so many vicissitudes, the shareholders now allowed the property to pass out of their hands. As stated in the report, the Central Mine had produced gold to the value of 99900, upon a very limited extent of works, which is a most encouraging feature, although no portion of the amount had passed into the pockets of shareholders. It must be recollected that when operations were commenced at the Central Mine the capital at command was very limited indeed, not exceeding, he thought, 10000, so that the revenue in the shape of gold returns had been devoted to the development of the mine, which had been subjected at two or three different times to accidents which are not unlooked for in a mine of this character during the preliminary development—such, for instance, as outbursts of water. They are, however, now advised that every means had been taken to prevent their recurrence. At the last meeting, held in September, 1871, a resolution was passed adopting a plan of reconstruction which the directors then submitted—that plan was a re-formation of the company, taking over the existing assets. That, however, fell through, because directly after that resolution was passed they heard of the sale of the Duke of Cornwall Mine, and the immediate resumption of the works at the Central, and it was hoped that long before this such results would have been realised as to prevent the disagreeable necessity of again appealing to the shareholders for their support. Of the 30,000 shares then authorised to be issued at 10s. discount, above 11,000 were allotted, including 2000 to Mr. Kitto, which latter had not been paid up; there was still the power of issuing 16,976 of those shares, and the directors proposed inviting the shareholders to subscribe for them, and so redeem the mine from its present disastrous position. Each of the directors will subscribe their proportion, and make every exertion to save a property which he believed, and all the directors believed, will yet prove a valuable mine, and recoup the shareholders their loss; but he did hope the shareholders, as a body, will come forward and assist the board in extricating the company from its present position. (Hear, hear.) The directors have power, by the Articles of Association, to borrow any sum not less than 50000, upon a mortgage upon that property, but if that course be adopted the probability is that a ruinous rate of interest will have to be paid. He then moved that the report and accounts be received and adopted.

Mr. J. W. WILLIAMSON seconded the proposition. The CHAIRMAN, in reply to questions, stated that he believed Mr. Kitto was now on his way to this country, and if that were so the shareholders would, in all probability, have an opportunity of hearing the reasons why his many promises had not been realised. The directors are very much disappointed at the measure, and in some cases total absence of advices. Mr. Lamb, a man of respectability and honour, had thrown upon him a great deal of responsibility and work. Mr. Kitto was appointed in the original instance managing director, at a salary of 10000 per annum; but a subsequent contract was entered into upon different terms, and which they had been advised annulled the first contract. A power of attorney had been sent out to Mr. Lamb to supersede Mr. Kitto, and appoint someone else in his place. Mr. Kitto, however, held that he had been appointed by the shareholders, who alone had power to determine the contract. Mr. Kitto was coming home with the avowed intention of meeting the shareholders, and the directors were most desirous to afford him the opportunity.

A SHAREHOLDER had noticed that Mr. Kitto's reports had not only been unsatisfactory, but equally contradictory, which could not be explained.

The CHAIRMAN, in reply to questions, stated that the manager had left without asking the consent of the board. As to the sale of the Duke of Cornwall, the sum of 10500 had not been received, Mr. Kitto detaching that amount as commission for the sale of the mine, which, as the directors had pointed out to him, is a manifest inconsistency, and legally untenable. Mr. Lamb, who took a very large personal

interest in the company, received 2500 per year. On Feb. 27 the liabilities amounted to 17000, since when he did not suppose the amount had increased more than 5000, or 6000. At the time the 5000 was sent home it was against the wish of Mr. Lamb, the company at the time not being out of debt.

Mr. GILL (who has known the mine for many years, and had considerable experience in alluvial mining) said that the Central had been for some time past worked only from hand to mouth. Smallness of capital necessitates a certain class of operations which is not very advantageous. The consequence is the mine is not properly drained, so that in exploring ground these bursts of water occur, destroying a great deal of the past work—hence numerous losses. When he left the colony everything appeared to be in capital working order, and drifts were beginning to be blocked out, everything indicating a highly remunerative affair. The first intelligence he received upon his arrival in England was that one of these bursts had taken place; but still the gold is there, and the only thing required is an expenditure of capital so as to open the mine and enable it to be extracted. The one great thing requisite is a fund to fall back upon should another burst occur.

The CHAIRMAN asked what amount would be a proper sum, taking the present indebtedness of the company into consideration, to form such a reserve fund?

Mr. GILL: 40000, to 50000, would provide liberally for all contingencies. Alluvial mining is different to rock mining; until the drifts are made to enable the gold to be extracted a mine unprovided with a contingency fund has to be explored the best way it can, and, necessarily, in a most wasteful manner. By a proper exploration outburst of water could be entirely prevented in time. He thought that the information communicated in the telegram referred to the eastern gutter—the main gutter—which ought to have been tested long before this, and would have been there sufficient capital. The mine contains an enormous quantity of gold; the eastern gutter is the main bed, which has many tributaries, ancient water-courses feeding the main bed. There can be no possible doubt about the value of the property, nor that it contains an enormous quantity of gold, and he was not speaking without some experience. (Hear, hear.)

The motion adopting the report and accounts was put and carried unanimously.

The directors unanimously agreed to reduce their remuneration to 500 per annum each until the mine was in a dividend-paying condition.

Mr. Dawkes and Major Jelf Sharp were re-elected directors, and Messrs. Johnston, Cooper, Wintle, and Evans were re-appointed auditors.

After some discussion a resolution was passed requesting the directors to exercise the power given them in the Articles of Association to raise any sum not exceeding 50000, on debenture bonds, bearing an interest of 15 per cent., redeemable in three years.

The sum of 10000, was subscribed in the room, of which amount 7000, was subscribed by the directors and manager, and a telegram was forwarded to Mr. Lamb informing him that 10000, would be sent out by the next mail.

A unanimous vote of thanks was passed to the Chairman and directors, which closed the proceedings.

ANGLO-AUSTRALIAN GOLD MINING COMPANY.

A general meeting of shareholders was held on Wednesday.

Mr. E. W. WINGROVE in the chair.

The directors report stated they had hoped they would have been able to report something of a more favourable and definite character respecting the property. The negotiation for the sale of the mine, formerly reported, fell through, caused as they believe, by the death of the person who entertained the matter. The balance of assets over liabilities is 35850, after charging the expenses in the colony up to the end of January, 1873, of which sum 16850, ss. 8d. is in the hands of the managers in the colony, and in course of remittance to them, and available for further works from that date. They would observe that the calls in arrears amount to 22511. 8s.; but the directors regret that about 4000, of this sum must be considered bad, reducing the unpaid calls to 18511. 8s., and of this sum 6250, is in dispute, but steps are being taken to recover all outstanding. As further capital will be required, the directors have been considering how this is to be raised. They are authorised by the Articles of Association to borrow any sum not exceeding a total of 50000; and as Mr. Lamb thinks that this sum could be raised in the colony on mortgage of the entire property, they propose in the first place to invite subscriptions from the shareholders on mortgage bonds bearing 10 per cent. interest, and failing to raise a sufficient sum by this means, to send out a power of attorney to enable the money to be obtained in Australia.

The CHAIRMAN said the position of this company is scarcely more satisfactory than the Australian United. They are getting near to the end of their resources, and had not yet attained any appreciable results. The last accounts, received up to the date of Feb. 27, gave the latest report upon the condition and prospects of the mine. At the depth reached in the eastern shaft a fine well-defined lode has been met with and cut through to the west wall, but so far gold has not been found to any value. In the western shaft operations were being carried on, but up to the date of the last accounts nothing of any special value had been met with, but 20 tons of stuff had been taken to the mill for the purpose of testing its quality, and Mr. Lamb says he did not expect it will yield very good results. There is no doubt that in depth the ground will be more settled, and he hoped and believed satisfactory returns made. The mine has been tested to only a comparatively small extent, while it is admitted on all hands that it presents every indication of proving a great success. At the end of January they had in hand 16850, sufficient to carry on the operations for three or four months, by which time, it is to be hoped, some discoveries of importance and value will be made. Finding themselves drawing pretty near to the end of their resources they communicated with Mr. Lamb as to the probability of being able to borrow in the colony a sum of money not exceeding a total of 50000, which they were authorised to do by the Articles of Association, on the mortgage of the mines. Mr. Lamb's reply was that he thought it could be borrowed in the colony, and it is just possible he might be able to place the bonds in the colony at less than 10 per cent. In this company Messrs. Lamb and Kitto were the two resident managing directors, and Mr. Lamb had exercised a control over the finances, Mr. Kitto's work being confined to the mine management; and when Mr. Kitto left the colony Mr. Lamb, who resided on the spot, was left in charge, and would not leave until everything was made perfectly secure, so far as the property is concerned. Mr. Lamb held a very large pecuniary interest in the company. He would take the opportunity of stating that, taking into consideration of the financial condition of the company, the directors were perfectly willing to accept as remuneration the sum of 500 each per annum until dividends should be declared, when they would revert to the amount set forth in the Articles. (Hear, hear.) They had given as an appendix to their report extracts from the advices that had been received from March, 1872, until the present time, which gave all the information the directors possessed as to the position of the mine. He then moved that the report and accounts be received and adopted. Mr. DAUKES seconded the proposition.

The CHAIRMAN, in reply to a question, stated that the directors held nearly one-third of the shares into which the company was divided.

The report and accounts were received and adopted.

Mr. Dawkes and Major Jelf Sharp were re-elected directors; and Messrs. Johnston, Cooper, Wintle, and Evans were re-appointed auditors.

A unanimous vote of thanks was passed to the Chairman and directors.

The CHAIRMAN having acknowledged the compliment, stated that as soon as Mr. Kitto arrives in England he shall have an opportunity of meeting the shareholders.

The proceedings then terminated.

CAFARTIA LEAD MINING COMPANY.

An extraordinary general meeting of shareholders was held at the company's offices, New Broad-street, on Monday.

Lord R. HOWE BROWN in the chair.

Mr. ARCHBOLD (secretary) read the notice convening the meeting.

The CHAIRMAN remarked that at the previous meeting they were unable to get a quorum, and were, therefore, compelled to adjourn without doing the business for which they were called together. He feared they were not then sufficiently represented, as he understood that three-fourths in number and value of the shares issued were necessary to pass a special resolution. Now the total number of shares subscribed for was 7000, and three-fourths of that was 5250. The directors had used every endeavour to get shareholders to attend, yet they were still about 902 shares short; but he did not know how many were represented on the other side of the table. What they proposed, therefore, to do was to adjourn to a definite day, and, if it met the approval of the shareholders, he would move that the meeting be adjourned for a month.

A SHAREHOLDER said that he held 5000, stock in the company, and he believed other equally large shareholders were present.—Mr. WATSON believed the 5000, stock represented 100 shares, and his own holding was, therefore, the same as Mr. Alexander's. He presumed that the object of the adjournment was that the proxies might remain valid.—The CHAIRMAN said precisely so; there would then be no necessity to trouble the shareholders to sign fresh proxies for carrying out the same object.

The SOLICITOR explained that the opinion that three-fourths of the shares issued must be present to make a special resolution valid was erroneous; all they required was that three-fourths in number and value of those present at the meeting, so that they were quite competent to pass the resolution if they thought proper.

The CHAIRMAN said that altered the case materially, but still he thought the best course they could adopt would be to adjourn, as they had only that morning received an offer of purchase, which if carried out would greatly facilitate the satisfactory liquidation of the company. The adjournment for a month would permit of the result of the negotiations being known.

Mr. WATSON enquired how much was originally subscribed?—The CHAIRMAN said the public subscribed about 90000, and they had available for the actual working of the property about 80000,—he believed the exact amount was 79150.

A SHAREHOLDER would like to know whether they considered they were justified in commencing with that amount, or whether they were hampered for money?—The CHAIRMAN believed they were fully justified in commencing; they believed that the 79150, would be sufficient, because they had just commenced upon a deposit of lead, which they thought would be continuous; it proved, however,

to be a bunch only, and the lead soon gave out. They were not at all hampered for funds at first, and had, indeed, a small amount still at their bankers; but, as their capital was comparatively limited, they could not do more than keep the property.

Mr. WATSON believed the directors had never received any remuneration for their services?—The CHAIRMAN said they had received a little remuneration for the first few months of the company's existence; but as soon as they found that the concern was not turning out as profitable as they had anticipated they ceased to take fees. For the last two years they had received nothing.

It was then proposed by the CHAIRMAN, seconded by Mr. WATSON, and resolved unanimously, that the meeting be adjourned until Wednesday, May 21, at the same time and place, the proceedings terminating with the usual vote of thanks to the Chairman.

PENHALE ST. BROCK SILVER-LEAD MINING COMPANY.

The general meeting of the shareholders was held at the Barley Sheaf Hotel, St. Columb, on Wednesday.

Mr. H. F. WHITEFIELD, the purser, in the chair.

The notice convening the meeting was read, and the minutes of the last meeting were confirmed.

Capt. HANCOCK reported that the level had been extended south of the cross-cut about 35 fms., the lode varying in size from 2 to 3 ft. wide, composed of flookan, gossan, quartz, mudstone, and good bits of silver-lead. The lode in the extreme end of much the same appearance, with a good deal of water of the level in the lead ground driven through to more fully determine as to the future operations for further development of the mine.

The balance-sheet, showing a balance of 411. 10s. against the company, was submitted to the meeting and passed, and a call of 6d. per share was made, payable to the purser in 14 days.

The very promising appearance of the mine was the subject of congratulation and discussion by the meeting, and it was ultimately decided that as the time had now arrived for more extended operations the company should be formed into a Limited Liability Company, with a capital of 15,000, and the purser was directed to take the necessary steps for that purpose.

THE MINING ASSOCIATION.

The annual general meeting of shareholders was held at the office, 8, Austinfrs, on Thursday.—Mr. J. W. WILLIAMSON in the chair.

Mr. E. ASHMEAD (the secretary) read the notice convening the meeting.

The report stated:—Your directors have hitherto deferred calling a general meeting of the company, in the anticipation that the reports from the Australian United Gold Mining Company (Limited), in which this company has so large an interest, would have so far improved as to have materially altered the position of this company. To a certain extent this has been the case, and there is a considerable increase in the value of the shares held by this company. The last reports from Australia, of which an extract is appended, were considered very hopeful, and the ultimate result will yet be satisfactory. In the meantime certain liabilities in respect of shares held by this company, and which your directors have deferred dealing with hitherto, have become pressing, and to meet them money must be raised, and it is proposed that a small call should be made, sufficient to clear the company from all liabilities. The liabilities are of old standing, and no fresh ones have been incurred. The expenses have been reduced to a minimum, the costs of management merely nominal (which, however, have not been paid for some time), the object being to relieve the shareholders as much as possible, and also retain the various shares held by the company, to abide the issue of the explorations in course of trial. Your directors were pledged not to make any call without laying the matter before a meeting of the proprietors, and it is in redemption of this pledge that the concurrence of the shareholders is now asked on the course proposed by the directors. One of your directors, Mr. Williamson, retires by rotation, but offers himself for re-election. Mr. Brandt, the auditor, also offers himself for re-election.

The report and balance-sheet were carried, and the directors recommended to make a call of 3s. 6d. per share, a sum sufficient to cover all the liabilities (which amounted by the accounts to 2114. 13s.), and leave the company in possession of their investments fully paid up. Mr. Williamson was re-elected a director, and Mr. Brandt, auditor. A vote of thanks to the Chairman terminated the proceedings.

YORKE PENINSULA MINING COMPANY.

An extraordinary meeting of shareholders was held on Monday at the London Tavern (Mr. F. P. WARD in the chair), for the purpose of confirming resolutions passed at a special meeting held on March 21.

Mr. GRAINGER (the secretary) having read the notice convening the meeting.

The CHAIRMAN said:—Gentlemen, this is merely a formal meeting. We have to-day to confirm a resolution passed at our meeting a month ago. It will not be necessary, therefore, for me to detain you with any explanations, but simply ask you to assent to the confirmation of the resolution. Before doing so, however, I may say that the operations of the board in their endeavours to rescue the debentures into the proposed 15 per cent. guaranteed preference shares so far has been very satisfactory. At the same time, I must remark that it is a requisite that all the debenture holders should do their part, and exchange their debentures and deferred interest warrants for the preference shares, and everyone should do his best to take his proportion of the proposed new issue of shares, in order to make the operation completely successful. We have fair hopes that this will be speedily accomplished, but it is necessary in the meantime that all the debenture holders should send in notice to take the preference shares, because we shall not issue them unless we can extinguish the debentures. Unless we succeed in providing for the final extinction of the whole of the debentures we shall not issue these preference shares. I may say that the last news from the colony is very satisfactory in regard to the manner in which the allotments in the township of Aberdeen, on the Bon Accord property, are being taken up. The last news brings advices of applications for the purpose of erecting a large hotel and stores close to the railway. It is obvious that if we have a large hotel it will be an inducement to people to come to the township, and cause our allotments to increase in value. I dare say some of our friends have seen the paragraph in the papers about the discovery of a body of body of rich copper ore on the section adjoining the Kurila Mts. This discovery very much caused the shares of the company owning that section to rise from 10s. to 15s., and it has given us additional encouragement, and confidence that we will be finally successful. Our own feeling is as strong as ever. My concluding is stronger, for every advice we get confirms me in the impression that, with an adequate amount of capital, the company will finally be successful. I now come to No. 20 of the Articles of Association of the company, by altering by inserting therein after the word "purpose" the words following:—"to alter and so far modify the conditions contained in the Memorandum of Association of the company as to reduce its nominal capital by the amount of its unpaid shares."

Mr. GEORGE SMITH seconded the motion, which was carried unanimously.

Mr. ANDERSON: I beg to protest against it as a debenture holder. I shall not exchange my debentures, for I have no confidence in the board of directors.

The CHAIRMAN: Well, Mr. Anderson, it is my duty, as Chairman of the meeting, to inform you that, as the resolution has been passed, any further remarks out of order; but, as a matter of courtesy, I shall be happy to hear anything you may have to say on the subject.

Mr. ANDERSON: I am not going to make a speech, I have said all I have to say.

A SHAREHOLDER: I propose a vote of thanks to the gentlemen on the other side of the table. I think it is foolish to come forward and make the statements that the gentleman behind me has made. Surely he would have done better to have gone quietly to the board to intimate any objection he might feel to their plans for putting the company in a sound position. I propose a cordial vote of thanks to the directors.—Another SHAREHOLDER seconded it.

The motion was carried unanimously.

The CHAIRMAN: Gentlemen, we are very much obliged to you, and we hope you will show your earnestness by helping us as much as you can by taking the new stock freely, and so providing the necessary working capital.

The proceedings then terminated.

TRUMPET CONSOLS MINING COMPANY.

The quarterly meeting was held on April 18, Mr. HENRY ROGERS, of Helston (the purser), presiding.

The CHAIRMAN expressed regret that shortly after the last meeting, in the 163, which was reported to be looking very promising, they came across hard bare ground, the tin ground having gone west. The consequence was that they got no tin from that level, from which they had expected to raise several tons. But they had again reached the tin ground upon this level, and in the 153 they had a fine course of tin. In the 115, west of Wield Frances, where they expected to have a good run of tin ground, they had also been disappointed. But now the men had reached the branches in the right place, and Capt. Quentrell expected shortly to form a junction, whereby they would get their usual quantities of tin for this quarter. Although the returns of tin had been less, the permanent position of the mine was not in any way interfered with. He referred to the increased price of materials, and adverted in strong terms to the quality of the coal they had now to consume. They had not increased much in the tonnage, and they now had to use Cardiff instead of engine coal, but there was a serious falling off in the quality of this article. The cost for coal now made a tremendous difference to their accounts.—Mr. VIVIAN said the coals used to be screened in South Wales, but they could not get that done now, and the article had to be taken from the pit's mouth as it was, with an enormous quantity of small.

The CHAIRMAN reminded the meeting that the mine had paid dividends for six years consecutively, and he did not see why they should not do so again.

Mr. PEMBERTON asked why the splendid reserves of the mine had not been worked when there was a falling off of tin in the levels?—The CHAIRMAN said he had taken men away from sinking shafts and driving levels in order to get tin. They would, in the end, have been in the same position as they were before.

Now they had reached the end of the bad ground, and had come again upon mineral. Trumpet Consols was a valuable property, but it had to be tenderly dealt with.—The report of the agents, the salient points of which were given in the Chairman's speech, having been read, Mr. JEFFREY expressed an opinion that the price of coals would go down.—The CHAIRMAN said coals had been brought to the mine which were not worth the cost of the carriage, and he, for one, would not stand it much longer. If they paid a high price for coal they ought to get the value of their money. Now they were paying about 12. 13s. 6d. per ton.—On the motion of Mr. BROAD, seconded by Mr. EDWARDS, the accounts and agents' report were adopted, and at the suggestion of the former gentleman the following addition was made to the report of the agents:—"We have in no way interfered with the reserves for the purpose of improving the accounts."—Subsequently, in giving "Success to the Mine," the CHAIRMAN said, although disappointment had been felt by their not declaring a dividend, he had the same confidence in Trumpet Consols as ever. Previous to the last meeting they sold tin at 95s. a ton; they had only received for it in the past quarter 87. 10s.—Mr. R. R. BROAD proposed the meeting be adjourned.

He dared say the unfavourable circumstances of the tin market were as disagreeable to Mr. Rogers as they were unexpected by the shareholders. No blame could be attached to the purser or agents, who managed the concern economically. Having heard so much about worthless coal being sold, he suggested

This great model of an interesting district of the Australian gold fields extends over a surface measuring 21 ft. by 12 ft., planned to a scale of 20 ft. to the inch, and affords an admirable bird's-eye view of the west and east portions of the town of Ballarat. It is watered by the stream called the Yarrow Wee, deep and full during the winter season, but in summer it is a complete mud channel. Gold was first discovered in this district in 1851, since which the finding of the precious metal has increased and extended, without any seeming prospect of limitation. Models of two nuggets are exhibited, one called "The Welcome Nugget," sold for 10,500*l.*; the other, "The Welcome Stranger," weighed over 2329 ozs., being the larger of the two. The surface workings at these diggings give a stranger the idea of the presence of coal mines, changing only slaty grassy for black. Deep sinkings are, however, now everywhere varying from 300 ft. to 600 ft. in depth. None of these appear to be exhausted although frequently changing hands. Their produce of quartz is on an average equal to 1000 tons per week, per man on each claim. The entire property is in the possession of private landholders. The model has its surface studded over long lines of either red or blue flags, at first designed to mark the course taken by the alluvial gold drift; and the second to denote the course of the uniferous quartz rock. This model was made on the spot by Mr. J. E. Lowe, a surveyor of Ballarat, and affords valuable information in a short period, but it is in reality only the central portion of a rapidly increasing district.

FOREIGN MINING AND METALLURGY.

Copper has experienced no change upon the Paris market, Chilian in bars making 96½ per ton; ditto in ingots, 98½ per ton; tough cake, 98½ per ton; and Corocoro minerals (pure standard), 94½ per ton, delivered at Havre. At Marseilles copper continues very firm; Spanish in plates brings 94½, and small refined ingots 96½ per ton. The German markets present little interest, and prices, taken as a whole, have shown some weakness. There has been no great amount of business passing in tin at Paris; Banca, delivered at Havre or Paris, has realised 154½ 4s.; Straits ditto, 154½; and English, delivered at Havre or Rouen, 153½ per ton. At Marseilles the price of tin has been better supported of late. Transactions have been limited at Rotterdam, the requirements of consumption having been in great part provided for at the late sale; the market has, however, remained firm at 85½ fls. for Banca and 84½ fls. for Billiton. In Germany feebleness is the prevailing characteristic of the tin market. Rough French lead, delivered at Paris, has brought 26½ per ton; Spanish ditto, delivered at Havre, 24½ 8s. per ton; English ditto, 24½ per ton; and Belgian and German ditto, delivered at Paris, 24½ 8s. per ton. Upon the German lead markets prices have been generally firm. There has been scarcely any change in the Paris zinc market, but at Marseilles zinc has been slightly tending upwards. Upon the German zinc markets there have been no very important transactions, but prices have, nevertheless, been well maintained.

The demand for iron remains weak in France, merchants confining themselves to purchases to meet their most urgent requirements. Notwithstanding this state of things, prices continue to be quoted without variation, but this unnatural phenomenon cannot long continue. The proprietors of works appear to entertain hopes of indefinitely maintaining present prices, but there are grounds for believing that their anticipations will not be realised, and that the revival in metallurgical affairs for which they appear to be looking will be longer in coming than they suppose. Nothing of very striking interest has reached us this week from the French industrial centres. We may note, however, that the Pompey Works, in course of construction by M.M. Dupont and Dreyfus, have just lighted their first puddling-furnaces. These furnaces are on the old hand system. The construction of the Champignelles forges has been commenced. The Lille Chamber of Commerce has issued a report on the industries of the French department of the Nord. The report states that most of the mechanical establishments were fully occupied during 1872, and that they have generally work on hand for 1873. The profits of the works are, however, much reduced, in consequence of the great advance which has taken place in the prices of metals and combustibles—an advance which must considerably increase the cost of production. The Douges Coal Mines Company will commence the payment, on May 1, of a dividend of 10% per share. The Mokta-el-Hadid Magnetic Iron Minerals Company will pay, on May 1, the balance of its dividend for 1872. This balance is as nearly as possible 4 per cent. upon the share capital.

Stagnation seems to be becoming the order of the day in the Belgian iron trade. It is now a matter of notoriety in Belgian industrial circles that, with the exception of a small number of privileged works producing special articles, the great majority of Belgian industrialists are endeavouring to obtain fresh orders, those on their books being almost exhausted. The tacit and cordial understanding which existed between Belgian industrial firms during the period of prosperity through which the iron trade of Europe has just been passing begins to show symptoms of breaking up. The object of this understanding was the maintenance of high prices and uniform quotations, while competition is now once more re-appearing, so that contracts are being concluded by some works at 10 to 15 per cent. below the official figures. Upon the whole, it may be said that prices are nominal, and that the state of affairs is one which exhibits little or no stability. The exports of minerals and limestones from Belgium in January were 12,961 tons; those of rough pig and old iron, 20,15 tons; those of wire, 103 tons; those of rails, 7,905 tons; those of plates, 1,484 tons; those of other descriptions of iron, 6,265 tons. During January, 1872, the corresponding rail exports were only 3,036 tons, so that the rail exports of January, 1873, presented a considerable increase. The imports of iron minerals into Belgium in January amounted to 49,976 tons, of which 40,334 tons came from the Zollverein. Rough pig and old iron were also imported to the extent of 10,755 tons. The total imports of manufactured iron into Belgium in January were 19,000 tons. The increased value in round figures of the iron exported from Belgium in January, as compared with January, 1872, was 40,000. The demand for merchants' iron is weaker, and the basis price of 13½ 4s. per ton, which has prevailed for some time past, is now becoming altogether nominal, as transactions could be concluded at lower rates. On the other hand, the demand for girders and iron for construction purposes does not slacken. The high price of coal, pig, and coke, in presence of the existing torpor in the iron market, creates a difficult state of things for many Belgian forgers. The question, however, is whether any relief can be anticipated in the prices of raw materials under present circumstances.

In consequence of scanty arrivals, the Paris coal market has become rather inactive. Industrialists are anticipating a fall in quotations, which will enable them to readily lay in supplies. But if a downward tendency has prevailed upon the Paris market the collieries of the Nord and the Pas-de-Calais have maintained their pretensions firmly, and show little desire to engage their production too far in advance. The production has, in fact, been much reduced for some time past, as well in France as in Belgium, through the migration of a considerable number of workpeople. Stocks are, in consequence, of comparatively little importance. M. Dehaynin has closed his establishment at Marcinelle for the production of agglomerates, and he has resolved, it appears, to stop some other works still in activity as soon as contracts in course of execution have been completed. M. Dehaynin will still keep one of his establishments going. The importation of German coal into France does not appear likely to bring about much, if any, reduction in quotations, the cost of transport absorbing the difference between the price of this coal and that obtained from Belgian or French collieries. A contract for 166,000 tons of coal, concluded recently between the Parisian Gas Company and an English house, is stated to have been "retroceded" to a German firm, the English parties to the contract finding it impossible to execute it. The conditions upon which the contract is now being fulfilled are said to assure the English house a larger profit than it would have realised from the delivery of English coal. The French navigators do not exhibit much activity.

The production of the Belgian collieries remains below the demand. This circumstance partially explains the considerable purchases of German coal, the delivery of which is noted from day to day in the various industrial centres of Belgium. It would appear probable that if Belgian coalowners do not consent promptly to a reduction of rates the proprietors of Belgian coke-furnaces and metallurgical works will shortly conclude very important contracts with Ruhr collieries, to be executed in the course of this year. On the other hand, a small reduction in the price of Belgian coal would render it impossible for the Zollverein to compete with Belgian coal. Coke displays some feebleness in Belgium, and meets with few purchasers. The current quotation for coke is 2½ 8s. per ton. The general consumption of coal in Belgium is now far from what it was during the prosperous period through which we have just passed. In Germany, notwithstanding considerable purchases for France and Germany, the coal trade exhibits stagnation, and it seems strange that under such circumstances an effort should be made to establish a fresh advance, which can have no serious justification, especially if one takes into account the rather marked check observable in metallurgical industry. The imports of coal into Belgium in January were 27,229 tons, of which 7832 tons came from Germany, 9750 tons from England, and 8774 tons from France. The imports of coke into Belgium in January were 2584 tons. The exports of coal from Belgium in January were 587,562 tons; the exports of coke were 49,289 tons. Of the coal exported from Belgium in January, 352,357 tons went to France. A letter from Liège, referring to the imports of Ruhr coal into Belgium, states that the cost of conveying coal from the Ruhr to Liège is about 6s. 9d. per ton. The German coal

is more sulphurous than Belgian, but it leaves comparatively little ash, and this causes it to be tolerably well liked. Some of the blast-furnaces of the Luxembourg are stated to have concluded contracts with a view to obtaining supplies of English coke; the terms are said to be 65s. per ton, delivered at Antwerp.

FOREIGN MINES.

DON PEDRO NORTH DEL REY.—Telegram from Lisbon: Weighed to March 25, 2849 oits.; estimate for March, 4000 oits.

COLORADO TERRIBLE LOSE.—Ore raised during the month of February, 1873: First-class, 1 ton; value per ton, \$700—\$700.00. Second-class, 5 tons; value per ton, \$120—\$600.00. Third-class, 22 tons; value per ton, \$30—\$660.00. Fourth-class, 16 tons; value per ton, \$10—\$160.00. Total, \$2,120.00. Months' expenses: Management, \$355.00; mining cost, \$847.97; construction and office accounts, 45.00; powder, fuse and teamster, \$195.10; total, \$1443.16. Balance, \$676.84.

FRONTINO AND BOLIVIA.—The directors have advised under date Feb. 12, from Messrs. Restrepo, the company's bankers at Medellin, accompanied by the usual accounts, and a remittance of gold valued at \$207,165, the produce of the Bolivia Mines for the month ending Jan. 20. The following are the accounts for the month ending Jan. 20: Cost: At Frontino and Bolivia Mines, and expenses in London and Medellin, 1194½ 4s.; Produce from the Bolivia Mines, 352½ 4s.; from 1900 tons of mineral (average yield per ton 3 dwts. 17 grains, 820½ 16s.; less, 373½ 8s. The agent says: "The new mill is nearly completed, and we are busily engaged in laying down the tables, finishing the stamps, pass, &c. In a few days we shall commence the run of launders to carry the water to the wheel, and shall have everything completed so that the mill will commence working on the 20th inst., as before stated."

I. X. L. (Gold and Silver).—Mr. Lewis Chalmers writes (April 1): During the week but poor progress was made in sinking, so much time being occupied in water hoisting; shaft sunk only 5 ft. Water hoisted per hour, 420 gallons; this is over and above what the pump is throwing from the 100 ft. level. As the snow is going fast, I do not anticipate a continuance of this; if so, I must put in another pump. The 5 ft. was sunk through a very hard bar of rock, but I hope to report better progress next week. I am satisfied I have good men, and that they are doing all they can.

EXCHEQUER (Gold and Silver).—Mr. L. Chalmers, April 1: During the week ended the 29th we ran 21 ft. of the adit level mentioned in my last letter, and put in six sets of timbers. At this rate I shall reach the shaft this week. I am much vexed by the delay this has occasioned, but we shall save both time and money by the possession of such an adit in the long run. I think this crew will make good time in the shaft. Mill: During the past week the tightening pulleys for pan-belts were made, new screen-frames and stage for battery, windows and door frames, put in the settles and concentrating floors. The engineer has made bolts for fan-tighteners and battery frame, fitted gearing to pans, and are now babbling pan shafts. There is still a good deal to do; and, although I expected to be through with the mill by this date, I cannot say I cannot do so. I cannot say I am not a little anxious for completion, but it will not be more than a fortnight when I have my turbine to put in for saving. I will make an experimental run when through with the mill, but cannot run steadily until my engine-shaft is down to the 140 ft. level.

MALPASO GOLD WASHING.—C. R. Clarke, Feb. 17: Since we cleaned up last the machine has run 203 hours, 115 on new dirt and 85 on waste. During the clean up we added 150 ft. to our sluice, which I explained in my last. Since then we have put in 150 ft. of boxes on the ditch, where it had begun to give way. The past month has been very dry, and I never saw the streams so low since I have been in the country. For two weeks we did not average over 150 inches of rain. It began to rain again a few days ago, and we are now running between 300 and 400 in. I have started the shaft I spoke of in a former letter, for the purpose of prospecting, or rather ascertaining, the depth of the rich gravel below the sluice. The shaft is about 150 ft. west of the sluice, and is now down about 10 ft. I expect to strike the rich gravel in about 20 ft.; how deep that will be is what I want to learn. The streak of hard gravel that I have spoken about in former letters came away very slowly. We have not gone into it more than 15 ft. since our last clean up; but as I anticipated, as we wash away from the thin pile of boulders it thins down, and I think as we advance it will become less than half the thickness it is now. There is a streak of dirt coming in on the top of it that prospects very well, which gives me hope of doing very much better on this run than on our previous ones. The streak of cement up in the bank still continues, and has to be disposed of by breaking it up after it falls, so that the water will carry it off. I went a few days ago to see if the water to the west of the Cantarara could be brought into our ditch. I found it was a long way off, and would require a heavy outlay. The Agnes Clara is too low to be brought up into our ditch, but I am in hopes it can be brought as high as the tunnel. I intend to level it in a few days, and then to cut a ditch for it; it will be a great assistance in the dry seasons. I am now getting lumber shed for the purpose of building a comfortable house. I had put down 200 and 300 boards, but it will require about 500, as I have told you before. I have about 3000 lbs. of lead, and shall not have any more out for a long time. The general agent writes, under date Feb. 17: I hope to have a pretty good wash-up next time; we cannot wash-up monthly, as the custom is to wash-up only when the funnel requires new blocks. Clark just now reports bottom rich, cinnabar thicker as we get in; top rich, streak also getting thicker; so that the poor streak in the middle will eventually be cut out.

RICA GOLD WASHING.—C. R. Clarke, Feb. 15: The work under the supervision of Mr. Adams is progressing very satisfactorily. We have had the water through the whole course of the ditch, although it is not quite complete, there being several places to strengthen, and our reservoir to finish. There being a favourable place in the ditch, a reservoir that will hold all the water that comes down the ditch during the night, thus giving me full control of all the water now available. I am told that other water can be had, and intend to examine for myself next week. Our reservoir is of the following dimensions:—20 ft. long, 100 ft. it is 40 ft. wide and 10 ft. deep, and 100 ft. is 20 ft. wide and 6 ft. deep; our ditch runs directly through it. I have had everything constructed as strong as possible, but expect in case of heavy storms to have some trouble on the ditch with land slides, against which it is almost impossible to provide. We have a very good prospect of doing very much better on this run than on our previous ones. The pipe is all completed, and ready to go down. I had put down 200 and 300 boards, but it will require about 500, as I have told you before. I have about 3000 lbs. of lead, and shall not have any more out for a long time. The general agent writes, under date Feb. 17: I hope to have a pretty good wash-up next time; we cannot wash-up monthly, as the custom is to wash-up only when the funnel requires new blocks. Clark just now reports bottom rich, cinnabar thicker as we get in; top rich, streak also getting thicker; so that the poor streak in the middle will eventually be cut out.

CRESCENT (Gold).—A. M. Stetson, March 29: I again started crushing with 16 stamps on March 19, and have tried rock from the different levels, but until to-day the ore from the western end of the first level of the "Pet" alone would pay for crushing. I am now running the dirt east on the third level of the Crescent, and get good prospecting ore from where I started to drive, and expect soon to get stuff that will pay to go after, judging from what I saw in the second level. In that level, at about 150 ft. west from Bradford's shaft, I took out from the bottom some ore, which I found to be the best I have seen in the mine, and if I can get such in the third level I am satisfied it will pay \$20 per ton. The ore at the western end of the Pet looks better as we go in; the lode is 3 ft. thick. I have now been able to examine the mine pretty thoroughly, and am sure that it will be necessary to sink deeper before we get a good paying mine; as although we get good ore at the two points above named, they are not as yet sufficiently developed to sink a new main shaft (the shaft (Bradford's) is the only one that is worked) to the pump in, and the ground where the hoisting works are is so crooked for so much to permit us to obtain good foundations. My idea is to sink at about 800 ft. west of the present hoisting works a small shaft down to the bed rock, and then, by running a cross-cut to strike the lodes, to determine the spot for the main shaft. The expense of sinking a prospecting shaft would be light, as the main shaft is about 25 ft. thick at the spot named, and the ground towards the west is, as I have already found in driving, softer than towards the east. The prospecting shaft I intend, we then, to permit, to begin on April 1. I estimate the cost of sinking the new main shaft, timbering it, and removing the hoisting works, will amount to about \$12,000. Miners are still very scarce, and command higher wages than formerly.

MALABAR.—An important letter has been received from Mr. W. S. Welton (Malabar, Feb. 6), in which he says he and Mr. Clarke, of the Malpas Company, have been two days examining the Castrilla Mine, which is so extensive that they were unable to complete their examination for selection of outlet; they were fully occupied prospecting gravel. The mine is divided by a high ridge, on which the ditch is carried, and the works extend to great distance on each side. On the north side the works extend in a diagonal direction to the central ridge in a north-easterly direction, and have a distinct outlet. The works in the opposite direction have been carried on a level, and are discharging into the River Medina. The hill appears to be composed of altered sandstone and shales, and is covered with a thin layer of soil. Similar to the bottom gravel at the Malpas Mine. Mr. Clarke and himself are of opinion that the opening of the mine should be commenced on the Medina side of the ridge, as the fall is more rapid on that side than on any other, and less length of pipe and flume would be required. It is considered that the present ditch would bring in sufficient water for two full-sized hydraulic machines, and with this power at command he is of opinion that the Castrilla Mine will make the best-paying mine yet discovered in the country.

BATTLE MOUNTAIN.—Captain Richards, March 20: Virgin: The 143 feet level, north of Daniel's winze, has for a few days been suspended, but is again being driven, and the lode produces some quantity of very fine ore. This point being the deepest from the present workings I think it extremely promising. The slope in back of the 143 ft. level is yielding a fine quantity of oxides and blue carbonates of copper, the slope having much improved in its yield since last week. The 113 feet level north has improved in some respects during the past few days. It is now yielding a little ore, and the ground presents a promising appearance. John's rise in back of the 113 ft. level has been holed to the 73 ft. level, improving the ventilation of the entire works. This rise has also opened some good ore ground. Hooper's rise has also improved since last week, but is at present suspended, as the men are required elsewhere. Stopes are being opened north and south of this rise, these are producing some good ore. Work has been resumed in Pascoe's stoppe back of the 73 feet level; the lode is large, and throughout produces veins and pockets of good ore; 300 sacks raised during the week.

—Capt. Richards, March 27: The only change in the mine since last week is an improvement in the 145 feet level, being driven north of Daniel's winze. There is an increase in the richness and quantity of ore. Work has been resumed in Hooper's rise in the back of the 73 ft. level. The lode produces occasionally some stones of good ore: 350 sacks raised during the week.

WEST CANADA.—March 21: Huron Copper Bay: The stoppe in the back of the 90 fathom level, east of Bay's shaft, will yield 2 tons of copper ore per fathom. A stoppe in the bottom of the 35, east of Bay's shaft, is yielding 2½ tons per fathom, and one in the bottom of the 35 fathom level, west of Palmer's shaft, 5 tons per fathom.

BRENSBERG.—J. W. Hoffman, April 19: I regret to say that owing to repeated trouble with our pump, we have not made the desired progress in the sinking of the shaft. There are several parts of the pumps which require repairing or renewing, but which cannot be done until the new pumps are here, and at work, and I am, therefore, very glad to hear that it will be sent off this week. I have obtained further assistance from the machinists to fix the dressing machinery,

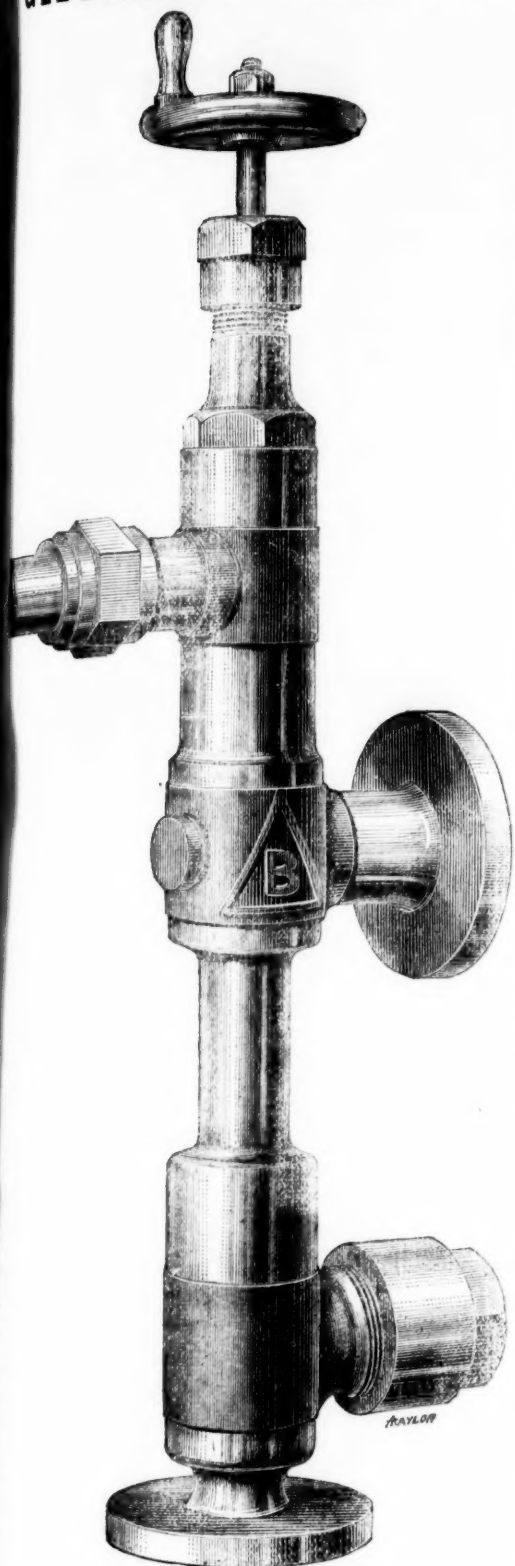
and we are now making rapid progress. In the open-cut there is no change. We are still getting good carbonate, and shall sample about 200 tons this week. Our production of ore:—Carbonate, 40 tons of 50 per cent. average assay; rock ore, 25 tons of 100 per cent. average assay; delivered, 65 tons of 50 per cent. average assay; stock on hand (ready for market), 80 tons of 50 per cent. average assay.

MONTE ALBO.—April 15: Su Ergio: In No. 7 level, driving south from new shaft, the lode is 1 metre 50 centimetres wide, composed of white iron, and blende, intermixed with spots of ore, but not in sufficient quantity to value. In the cross-cut, driving east on No. 4 level, south from new shaft, we have not as yet intersected anything to report on.—Stopes: These continue to yield back of No. 6, south of new shaft, which is not so good. I think the stoppe will improve as we get near the bottom of No. 5 level. Julius Caesar cross-cut is still being continued, and is without change since last report. We find as the stoppe weather increases the air here begins to get bad. The cross-cut south from B lode is still hard for driving.—Dressing Department: The weather has settled in very fine, and up to date we have sufficient water to keep on our crusher.

LINARES.—April 9: Pozo Ancho: The lode in the 85 ft. level, west of Crosby's shaft, is small, and the ground very hard for driving. There is no improvement in the 75, west of Crosby's shaft. The lode in 75, west of San Francisco shaft, is changeable, and has improved in the last few days to 2 tons of ore per fathom. In the 75, east of San Francisco shaft, the lode continues very small, yielding ½ ton of ore per fathom. The ground is a little easier for driving in the 65, west of San Francisco shaft, and the lode of a better appearance. The 55, west of San Francisco shaft, is very regular, and opening tribute ground, yielding 1 ton of ore per fathom. The 55, east of San Francisco shaft, has improved, and is now opening productive ground, worth 1 ton per fathom. The lode in the 45, east of San Francisco shaft, continues unproductive. The tribute department yielded very well in the past month, and there is no alteration in the stoppe worthy of notice. The surface works are going on in a satisfactory manner, and the machinery is in good condition. We estimate the raisings for April at 200 tons. Quinientos Mine: The lode in the 65, west of Taylor's engine shaft, is a little larger than it was, and contains spots of ore. The 55, west of Taylor's engine shaft, is now passing through a strong cross-course. In the 65, east of Taylor's engine shaft, the ground is hard for driving, and the lode without lead. There is no improvement in the lode of the 55, east of Taylor's engine shaft. The lode in the 45, east of Addis's shaft, is a large, strong ore, composed chiefly of carbonate of lime and lead ore, yielding 2 tons of the latter per fathom. In the 45, west of San Carlos shaft, the lode is small, and spotted with lead. The lode in the 55, west of San Carlos shaft, is strong and open, and yielding good stones of ore. In the 65, east of San Carlos shaft, there are good stones of ore in bottom of the driving. The 55, east of Judd's shaft, continues very hard and poor. The 32, east of Judd's shaft, is opening a good run of ore ground, yielding 3 tons per fathom. In the 45, south of Henry's shaft, the lode has been intersected, and the men are put to drive east and west on its course.—Shafts and Winzes: In Taylor's engine shaft, below the 45, the men are getting on a little better—the lode is small and poor. In San Carlos shaft, below the 55, the granite is hard for sinking. The lode in Addis's shaft, below the 45, is small, and of no value. Cox's shaft, below the 45, is deep enough for 25, and the men are cross-cutting towards it. The lode in Luca's winze, below the 25, has become quite poor. Rajello's winze, below the 45, is going down in a fine vein of ore, yielding 4 tons per fathom. Old works continue in Jose's winze below the 25.

LUSITANIAN.—April 8: Pallal: In Taylor's engine-shaft, sinking below the 160, the lode has not been taken down, but we shall call it worth 2 tons per fathom. In River shaft, below the 130, the lode is from 6 to 8 feet wide, composed of quartz. Levels on Basto's Lode: The 160, east of Taylor's shaft, is being extended on a lode 8 feet wide, composed of quartz, yielding ¾ ton per fathom. The lode in the 150 is 8 ft. wide, composed entirely of quartz, and is 1½ ton per fathom. The lode in the 140 is 8 ft. wide, containing a little muddle. The lode in the 130 is 8 ft. wide, containing a little muddle. The lode in the 120 is 8 ft. wide, containing a little muddle. The lode in the 110 is 8 ft. wide, containing a little muddle. The lode in the 100 is 8 ft. wide, containing a little muddle. The lode in the 90 is 8 ft. wide, containing a little muddle. The lode in the 80 is 8 ft. wide, containing a little muddle. The lode in the 70 is 8 ft. wide, containing a little muddle. 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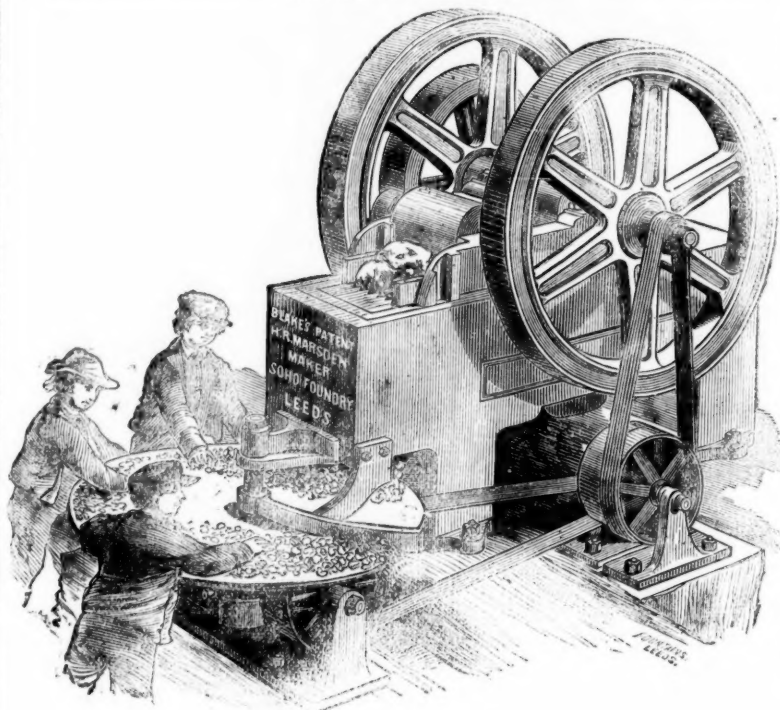
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and dispatch in their work, they are equal to any-
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Chacewater, Cornwall, Jan. 27, 1873.—I have
great pleasure in stating that the patent stone
breaker I bought of you some three years ago
for mines in Chili, continues to do its work well,
and gives great satisfaction. It crushes the
hardest copper ore stone—put it through ½ inch
size by horse power—with great ease. I can
safely recommend it to all in want of a crusher.
It can be driven by steam, water, or horse power.

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*Terras Tin Mining Co. (Limited), near Gran-
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stone crusher, supplied by you to this company, is
a fascination—the wonder and admiration of the
neighbourhood. Its simplicity is also surprising.
Persons visiting it when not at work have been
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mouthful of oats. On every 10 tons of the rock
crushed by the machine there is a direct saving
to the company of not less than £5 over the pro-
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being ever ready to perform the duties required
of it. It breaks the stuff much smaller, and in
forms so fitted for the stamps, that they will pul-
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Welsh Gold Mining Company, Dolgelly.—The
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est copper ore stone per hour.

WM. G. ROBERTS.

General Frémont's Mines, California.—The 15
by 7 in. machine effects a saving of the labour of
about 30 men, or \$75 per day. The high estima-
tion in which we hold your invention is shown by
the fact that Mr. Park has just ordered a third
machine for this estate. SILAS WILLIAMS.

Your stone breaker gives us great satisfaction.
We have broken 101 tons of Spanish pyrites with
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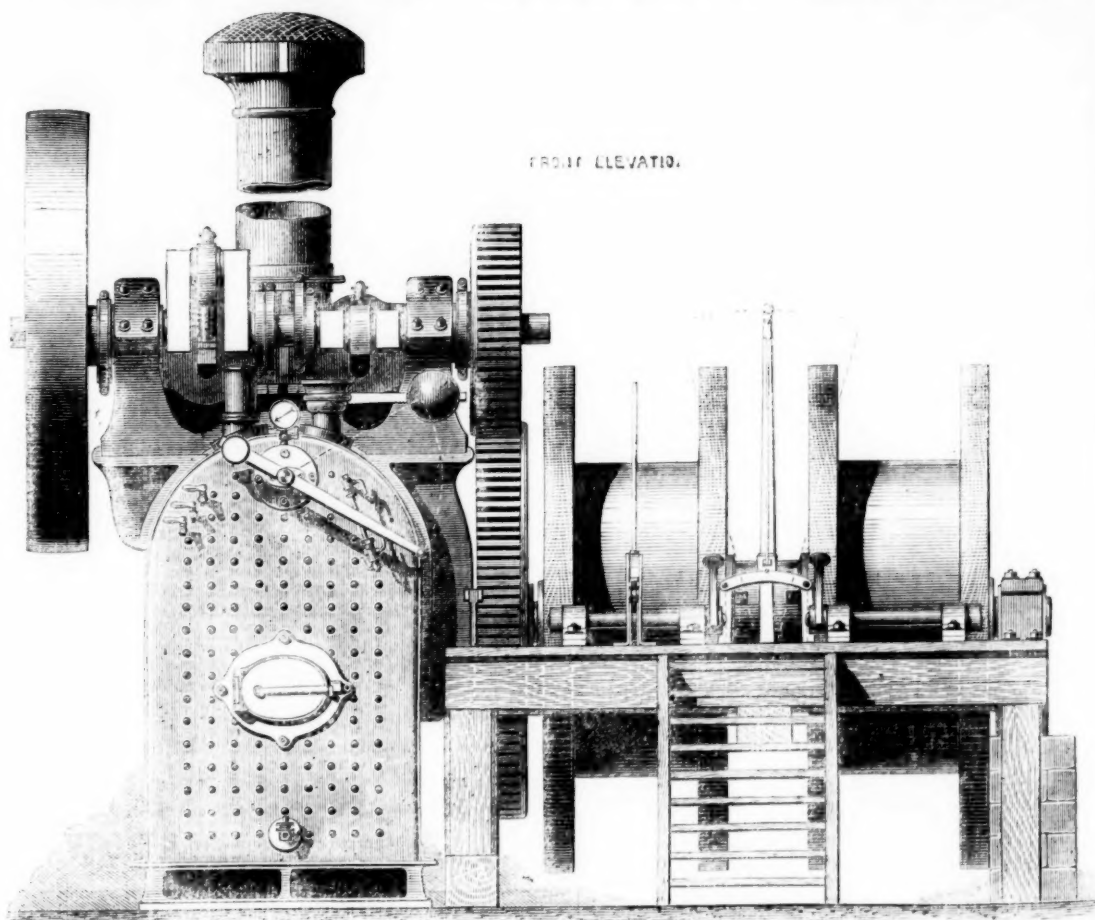


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FROM 20 TO 200 EFFECTIVE HORSE-POWER.

FOR FULL PARTICULARS AND PRICES, APPLY TO—

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ALSO OF PATENT PORTABLE

HAULING AND WINDING ENGINE

WITH

PATENT DRUM WINDLASSES,
FOR MINING PURPOSES.

This Engine is specially commended to Mining Engineers and others, as by its adoption—
Haulage along inclined drifts is easily and cheaply effected;
The expense of sinking new shafts is greatly reduced, neither foundations nor engine-house being required
It is available not only for winding, but for pumping, sawing, &c.—a great desideratum at a large colliery;
It can be very quickly removed (being self-propelling), and fixed in any desired position.
Prices and full particulars on application as above, and also references to view the engine in successful work near Derby, Carnarvon, Haverfordwest, Darlington, Durham, Penzance, and other places.

THESE ENGINES WORK WITH MARVELLOUS ECONOMY IN FUEL.

CHAS. PRICE AND CO.'S RANGOON ENGINE OIL,
AS SUPPLIED TO H.M. DOCKYARDS AND FLEET.



THIS OIL is suitable to every kind of Machinery. As a lubricant it is equal to the best Sperm or Lard Oil, while it possesses the great advantage of being entirely free from any principle which will corrode the metal bearings.

For particular kinds of Machinery, the Oil may be specially prepared of a consistency and character adapted to the nature of the work to be done.

"I herewith certify that the Rangoon Engine Oil, manufactured by Messrs. Chas. Price and Co., is free from any material which can produce corrosion of the metal work of machinery. It is indeed calculated to protect metallic surfaces from oxidation.

"The lubricating power of this oil is equal to Sperm or Lard Oil.

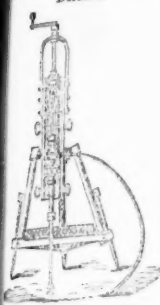
"T. W. KEATES, F.C.S., &c., &c.

Every parcel of the Oil sent from the work bears the Trade Mark of the Firm.
LONDON: CASTLE BAYNARD, UPPER THAMES STREET.
WORKS: MILLWALL, POPLAR; and ERITH, KENT

THE "BURLEIGH" ROCK-DRILLING MACHINERY.

THOMAS BROWN,
PATENTEE AND SOLE PROPRIETOR.

THE "BURLEIGH" ROCK
DRILL.



Machine and Stand for
QUARRYING and SINKING.

This celebrated ROCK DRILL, which by reason of its inherent merits has superseded all other Rock Drills, is now in extensive use in America, England, Scotland, and the Continent, and is indispensable in the economic working of all Railway Cuttings, Shafts, Quarries, and Mines. Its prominent features are:—

I.—ITS SIMPLICITY.

Any labourer can work it, and it does not get out of order. It may be worked either by air or steam power, at will, without any alteration of the mechanism.

II.—ITS DURABILITY.

No part of the mechanism is exposed; it is all enclosed within the cylinder—so there is no risk of its being broken.

III.—ITS CAPABILITY.

In hard rock, like granite, gneiss, iron-stone, quartz, the Tunnel Drill will progress at the incredible rate of 6 inches to 12 inches per minute. These machines can bore holes from 1 inch up to 5 inches in diameter, and, on an average, will go through 120 feet of rock per day—making 40 holes each from 2 to 3 feet deep. The drill can be used at any angle, and in any direction, and will drill and clear itself to any depth up to 20 feet.

IV.—ITS ECONOMY.

As compared with hand labour the saving in actual drilling is very considerable, from the fact of the "out put" being increased fourfold. The saving in the general expenses, and in the interest of capital, will be in a like ratio.

DRILL POINTS.

The saving in steel alone is incredible. ONE DRILL POINT WILL GO THROUGH TWENTY FEET OF ABERDEEN GRANITE WITHOUT SHARPENING. This fact will be duly appreciated by practical men.

For testimonials, estimates, and other information, apply to—

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AIR COMPRESSOR,
THOMAS BROWN,
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For driving the "Burleigh" Drill, or other Machinery.

The peculiar advantages which enhance the value of this Machine in the estimation of those who have it in practical use are—

1.—The pump pistons are driven by a steam-engine, the connection rods being attached to one crank shaft, the angles being so set that when the greatest power is developed in the steam cylinder the point of the greatest compression is being reached alternately in the air cylinders.

2.—The heat generated by compression of the air is reduced to nil.

3.—It is strong and durable compared with its effective power.

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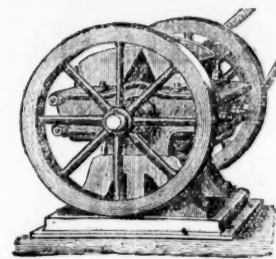
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Machine No. 1—The Direct Double-Action.

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**PATENT STONE BREAKING,
QUARTZ CRUSHING,
AND GRINDING MACHINERY.**

Messrs. T. BROWN and Co., ENGINEERS, have much pleasure in calling attention to their IMPROVED MACHINERY for STONE BREAKING and QUARTZ CRUSHING, for crushing, grinding, or triturating Stone, Flint, Minerals, Ores, Chemicals, and other substances; for washing and separating Metals from Ores, and for extracting Gold from Quartz.

The principle of this invention is applied to machines of various construction, which contain within the range of their capability the power of reducing all hard materials to cubes of from 2½ inches to impalpable powder. The mechanical construction of each description of machine is specially adapted for its own peculiar work, and experience has shown that each is eminently suited for the work for which it is designed.

They can be driven by water, steam, or horse power; they are light and portable, and their crushing and grinding surfaces are so constructed that when worn they can easily be replaced.

If intending purchasers would send a sample of the materials required to be crushed or broken it could be operated upon in their presence, and thus they would be guided in the selection of the machine best suited for their requirements.

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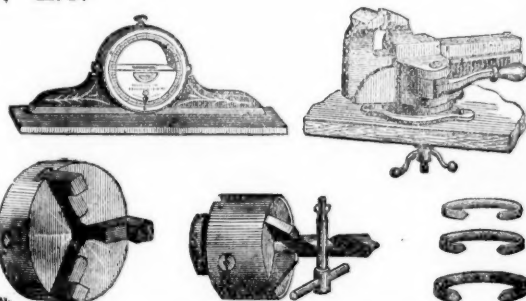
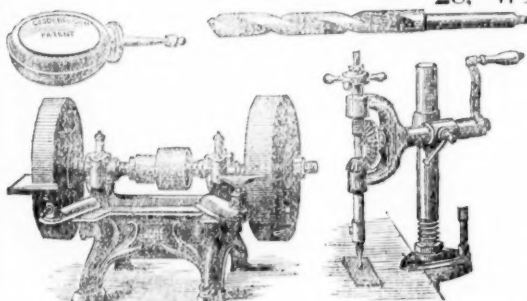
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IMPORTERS AND FACTORS OF AMERICAN MACHINERY AND TOOLS,
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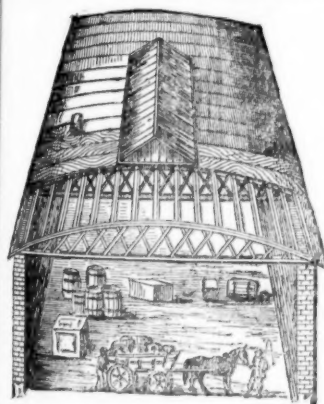
Morse's Twist Drill, and Machine Company's celebrated Twist Drills and Chucks; American Scroll Chucks; Stephens' Patent Vices; Parker's Patent Parallel and Swivel Vices; Gould Manufacturing Company's Well and Cistern Pumps; Washita, Arkansas, and Hindostan Oil Stones; and all other descriptions of American Tools and Machinery, &c., &c.

C. C. and Co. are prepared to give quotations and execute orders for American Goods of all descriptions, to be shipped to any port.

CATALOGUES AND PRICES CURRENT ON APPLICATION.



MTEAR AND CO.'S CIRCULAR ROOFING FELT



FOR
GREAT ECONOMY
AND
CLEAR WIDE SPACE.

For particulars, estimates,
and plans, address,—

MTEAR & CO.,

**28, BUDGE ROW, CANNON
STREET, LONDON;**

**51, PORTLAND STREET,
MANCHESTER;**

OR

**CORPORATION STREET,
BELFAST.**

The above drawing shows the construction of this cheap and handsome roof, now much used for covering factories, stores, sheds, farm buildings, &c., the principal of which are double bow and string girders of best pine timber, sheathed with ½ in. boards, supported on the girders by pulleys running longitudinally, the whole being covered with patent waterproof roofing felt. These roofs so combine lightness with strength that they can be constructed up to 100 ft. span without centre supports, thus not only affording a clear wide space, but effecting a great saving in the cost of roof and uprights. They can be made with or without top-lights, ventilators, &c. Felt roofs of any description executed in accordance with plans. Prices for plain roofs from 30s. to 60s. per square, according to span, size, and situation. Manufacturers of PATENT FELTED SHEATHING, for covering ships' bottoms under copper or zinc. IMPROVED FELT for lining damp walls and under floor cloths. DRY HAIR FELT, for desludging and for covering steam pipes, thereby saving 25 per cent. in fuel by preventing the radiation of heat. PATENT ASPHALTE ROOFING FELT, price 1d. per square foot. Wholesale buyers and exporters allowed liberal discounts. PATENT ROOFING VARNISH, in boxes from 3 gallons to any quantity required 8d. per gallon.

BY HER MAJESTY'S



ROYAL LETTERS PATENT.

**STANLEY'S PATENT FURNACE,
FOR SMELTING ORE OR RE-MELTING IRON OR OTHER METAL,
PUDDLING AND ALL KINDS OF HEATING FURNACES.
JOHN MARTIN STANLEY, PATENTEE & SOLE LICENSOR,
SHEFFIELD.**

The advantages of these furnaces are, in the first place, they effect a saving of from 25 to 50 per cent. in fuel. 2ndly, The use and expense of grate-bars are dispensed with, as these furnaces have closed fire-places, formed in brickwork. 3rdly, They make from 80 to 90 per cent. less ashes than open fire-grate furnaces. 4thly, They have a purer flame, the combustion is more complete, and contains less free or unmixed air or gases. 5thly, The workmen have much less labour in working these furnaces. 6thly, They heat quicker, and are more under the control of the furnace-men. 7thly, They are not affected by the position of the wind or draughts. 8thly, The mills and workshops are cooler and more comfortable than where the open fire-grate furnaces are used.

For prices, and other information, apply to J. M. STANLEY, 27, Change-alley, Sheffield.

**THOMAS WARDEN,
LIONEL STREET, BIRMINGHAM,
IRON AND STEEL MERCHANT,**

Manufacturer of Every Description of Railway, Colliery, and Contractors' Plant.
A LARGE STOCK OF SECOND HAND RAILS AND PLANT ALWAYS ON HAND.

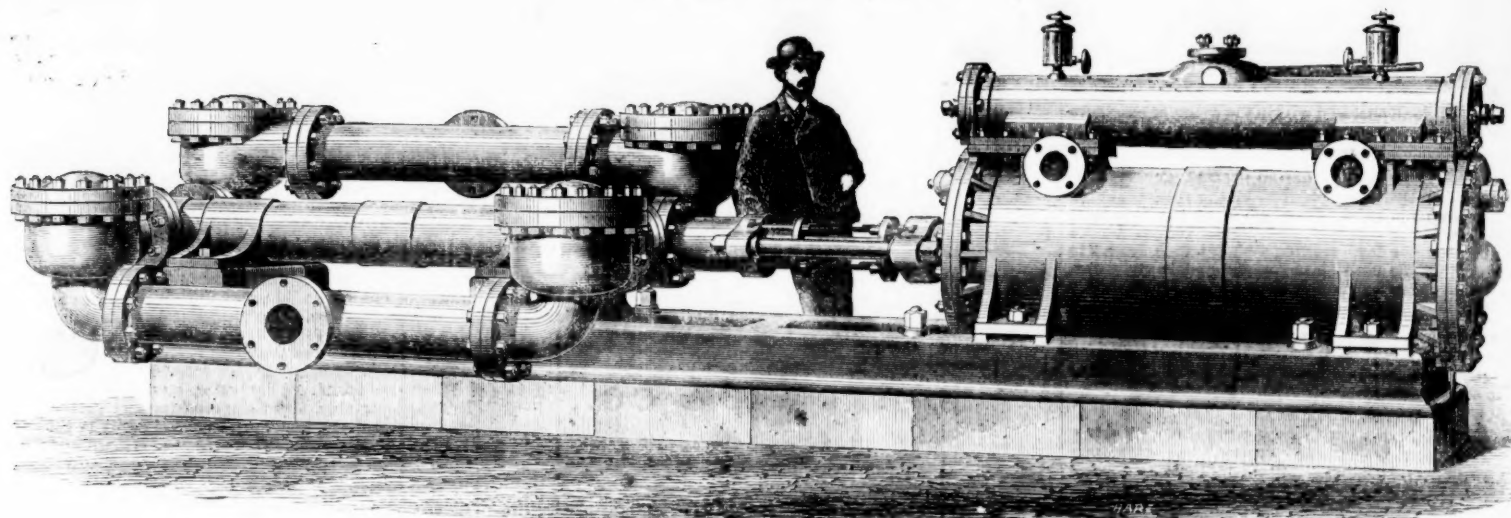
TANGYE BROTHERS AND HOLMAN,
10, LAURENCE POUNTNEY LANE, LONDON,

CORNWALL WORKS (TANGYE BROTHERS), BIRMINGHAM.

NEWCASTLE-ON-TYNE (TANGYE BROTHERS AND RAKE), OFFICES AND WAREHOUSE, ST. NICHOLAS' BUILDINGS,
SOLE MAKERS OF

THE "SPECIAL" DIRECT-ACTING STEAM PUMPING ENGINES
FOR FORCING WATER FROM MINES.

Nearly 3000 in Use.



The "SPECIAL" Direct-acting Steam Pumping Engines require no costly Engine Houses or massive foundations, no repetition of Plunger Lifts, ponderous Connecting-rods, or complication of Pitwork, and allow a clear shaft for hauling purposes.

Extract from "ENGINEERING," September 6th, 1872:

"The accompanying engraving illustrates a large specimen of the 'Special' Steam Pump, which was brought before the public about four years since by Messrs. Tangye Brothers and Holman. The Pump is the invention of Mr. S. Cameron, of New York, and since its introduction Messrs. Tangye have turned out nearly 3000 from their works.

"These pumps are of various sizes, and at first only small ones were made, but as their usefulness became developed the manufacturers designed pumping engines on the same principle for use in collieries. They were first applied to this purpose in the Newcastle collieries about three years since, and through the efforts of the late Mr. A. Stansfield Rake, under the direction of Messrs. Tangye, about 130 of these pumps had been introduced—principally in the collieries of the Durham and Newcastle districts, up to the end of 1870. They were adapted to perform the required duty—varying in almost every case—of forcing from 1000 to 10,000 gallons per hour from depths ranging from 100 to 500 ft. The success of this system of pumps led Mr. J. Bigland, the manager of Messrs. Pease's Bishop Auckland Collieries, to conclude that it was adapted for yet heavier work. The result of his investigations into its working led to the manufacture of the engine we have illustrated, for the Adelaide Collieries, belonging to Messrs. Pease, at Bishop Auckland.

"The construction of the Special Steam Pump is so well known

that we need now do no more than refer to the dimensions of the various parts. The steam cylinder is 26 in. diameter, and the pump—which is double acting—is 6½ in. diameter, with a 6-ft. stroke. The slide valve is steam-moved, and its alternate action is effected by means of two steel reversing valves, operated by the piston in the interior of the cylinder at either end. Hence there is no external mechanism except the piston rod, a few inches only of which is seen reciprocating between the stuffing boxes of the steam and pump cylinders. In the contract it was stipulated that the engine should raise 120 gallons per minute 1040 ft. high in a single lift, and this is more than accomplished, with apparently as much ease as if its load was delivered at only 100 ft. high.

"The engine-room at the Adelaide Collieries is situated at a depth of 1040 ft. below the surface, and is an arched chamber, about 100 ft. long by 20 ft. wide, and 10 ft. high at centre. At the far end of this chamber is a double-fueled boiler, 27 ft. long and 7 ft. in diameter. Placed between the boiler and the shaft is the pumping engine we have been describing. It was started on June 6, 1871, and Mr. Bigland reported that, having measured its duty, he found the average of seven trials to be 137 gallons per minute, thus giving a higher duty than was stipulated for in the contract.

*A still larger Special Steam Pump than the one already described

has since been made by Messrs. Tangey for Messrs. Stannier's collieries, Silverdale, Staffordshire. The steam cylinder of this engine is 32 in. in diameter, and the water cylinder 10½ in.; the stroke is 6 ft., and the engine has to raise 22,500 gallons per hour 540 ft. high. Two out of eight engines for some extensive coal mines in Germany are also in a forward state; each of these engines is to be capable of raising 150 gallons per minute, or 3000 gallons per hour, 750 ft. high. This system of underground pumping engine undoubtedly carries with it the recommendations of simplicity and great power, with a small number of mechanical parts. Its first cost is also very moderate, as compared with the method of raising water from great depths by a series of 40 or 50 fm. lifts. Its practical value was attested in 1867 by the award of a silver medal by the Royal Falmouth Polytechnic Society, which is composed chiefly of mining engineers. In fact, these engines appear to solve a very important commercial question in mining operations—viz., the most economical and effective means of deep mine drainage. Their success has been established in the coal mines of Durham and Newcastle, and there is no reason why their adoption should not follow, as occasion requires, in the copper and tin mines of Cornwall, some of which are of great depth; and especially for foreign mines, where transport convenience and economy are of paramount consideration."

The "Special" Steam Pumping Engines are in use at the following among many other Collieries:--

The Special Steam Pumping Engines are in use at the following among many other Collieries:-									
Adelaide Colliery, Bishop Auckland.....	3	Pumps.	North Bitchburn Colliery, Darlington.....	2	Pumps.	Stott, James and Company, Bardsley	1	Pumps.	
Acomb Colliery, Hexham	1	"	Newton Cap Colliery, Darlington	1	"	Straker and Love, Brancepeth Colliery	1	"	
Blackfell Colliery, Gateshead	1	"	Normanby Mines	1	"	Sutton Delaval Coal Colliery, near Newnastle	1	"	
Black Boy Colliery, Gateshead	1	"	Oakenshaw Colliery	1	"	Thornley Colliery, Ferryhill	2	"	
Castle Eden Colliery	2	"	Pease's West Colliery	2	"	Thompson, John, Gateshead	2	"	
Carr, W. C., Newcastle.....	4	"	Pease, J. and J. W., near Crook	5	"	Trimdon Grange Colliery	1	"	
Etherley Colliery	1	"	Pease, J. and J., Brandon Colliery	1	"	Tudhoe Colliery.....	4	"	
Gidlow, T., Wigan	3	"	Pegswood Colliery, near Morpeth.....	2	"	Vobster and Mells Colliery.....	2	"	
Haswell, Shotton and Easington Coal Company	3	"	Pelton Fell Colliery	1	"	Widdrington Colliery, Morpeth.....	5	"	
Lochgelly Iron and Coal Company	2	"	Railey Fell Colliery, Darlington	1	"	Whitworth and Spennymoor Colliery	5	"	
Lochore and Capeldrae Cannel Coal Company	6	"	Right Hon. Earl Durham, Fence Houses.....	1	"	Westerton Colliery, Bishop Auckland.....	1	"	
Leather, J. T., near Leeds	2	"	Skelton Mines	1	"	Wardley Colliery, Gateshead	1	"	
Lumley Colliery, Fence Houses.....	1	"	South Benwell Colliery	5	"	Westminster Brynbo Coal Company	2	"	
Monkwearmouth Colliery, Sunderland	1	"	St. Helens (Tindale) Colliery.....	1	"	Weardale Coal and Iron Company	5	"	

PARTICULARS OF THE "SPECIAL" STEAM PUMPING ENGINES SUITABLE FOR HIGH LIFTS IN MINES.

Diameter of Steam Cylinder	Inches	6	8	10	8	12	16	10	14	18	21	14	18	21	26	16	21	24	27
Diameter of Water Cylinder	Inches	3	3	3	4	4	4	5	5	5	5	6	6	6	6	7	7	7	7
Length of Stroke	Inches	24	24	36	24	36	48	24	36	36	48	36	36	48	72	36	48	48	48
Strokes per minute		30	30	20	30	20	15	30	20	20	15	20	20	15	10	20	15	15	15
Gallons per hour		2,200	2,200	2,200	3,500	3,900	3,900	6,100	6,100	6,100	6,100	8,800	8,800	8,800	8,800	11,900	11,900	11,900	11,900
Height in feet to which water can be raised with 40 lbs. pressure per square inch of steam at pump		240	425	665	240	540	900	240	470	775	1,053	330	540	710	1,140	312	540	700	700
Diameter of Suction and Delivery	Inches	2	2	2	3	3	3	3½	3½	3½	3½	4	4	4	4	5	5	5	5
Diameter of Steam Inlet	Inches	1	1½	1½	1½	2½	2½	1½	2½	3	3	2½	3	3½	4	2½	3½	4	4
Diameter of Exhaust	Inches	1	1½	1½	1½	2½	3	1½	2½	3½	4	2½	3½	4	5	3	4	4	4

PARTICULARS, &c.—Continued.

PARTICULARS, &c.—Continued.																	
Diameter of Steam Cylinder	Inches	30	18	24	30	32	18	24	30	36	21	30	36	42	36	44	50
Diameter of Water Cylinder	Inches	7	8	8	8	8	9	9	9	9	10	10	10	12	12	12	12
Diameter of Stroke	Inches	72	36	48	72	72	36	48	48	72	48	72	72	72	48	72	96
Strokes per minute		10	20	15	10	10	20	15	15	10	15	10	10	15	10	10	7½
Gallons per hour		11,900	15,660	15,660	15,660	15,660	19,800	19,800	19,800	19,800	24,400	24,400	24,400	24,400	35,240	35,240	35,240
Height in feet to which water can be raised with 40 lbs. pressure per square inch of steam at pump		1,100	300	540	840	960	240	427	665	960	264	540	780	1,062	282	540	800
Diameter of Suction and Delivery	Inches	5	6	6	6	6	7	7	7	7	8	8	8	8	10	10	10
Diameter of Steam Inlet	Inches	5	3	4	5	5½	3	4	5	6	3½	5	6	7	4	6	8
Diameter of Exhaust	Inches	6	3½	5	6	6½	3½	5	6	7	4	6	7	8	5	7	9

PRICES OF THE ABOVE ON APPLICATION.

Any combination can be made between the Steam and Water Cylinders, to suit Height of Lift and Pressure of Steam.

TANGYE BROTHERS & HOLMAN, 10, Laurence Pountney Lane, London, E.C.